

MOTOR AGE

Ray Harroun Victor in Speed Battle



LINEUP OF DRIVERS

BEFORE START OF RACE

Marmon Wasp Leads the Way Home in 500-Mile Race at Indianapolis—Mulford in Lozier and David Bruce-Brown in Fiat Second and Third—Contest So Close All in First Five Have a Chance to Last Lap—Winner Averages 74.7 Miles Per Hour—Crowd of 80,000 Packs the Park Grounds

INDIANAPOLIS, IND., May 30 — Speedway champion of 1910, Ray Harroun, of Chicago, driving the Marmon six-cylinder Wasp, and relieved for 100 miles by Cyrus Patschke, made good his title today by defeating the best field of cars and drivers ever brought together in this country, winning the 500-mile race on the 2½-mile speedway here at an average speed of 74.7 miles per hour, a mark far above that anticipated by even the most optimistic of the race fans.

Second to the Marmon and 5 minutes 38 seconds back of the long yellow car was the Lozier driven by Ralph Mulford, while 4 minutes 43 seconds behind the national road champion of 1910 was the winner of the

CHANGE IN RACE STANDING

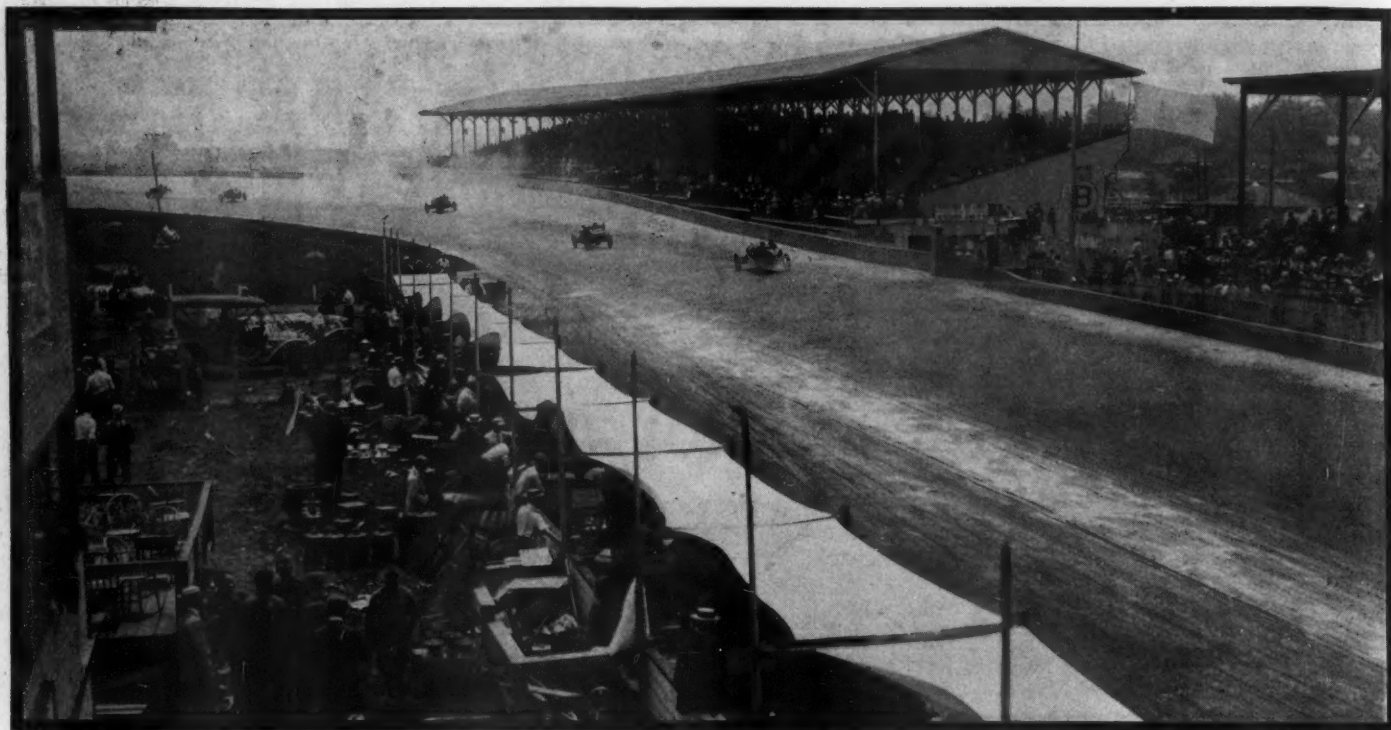
Indianapolis, Ind., June 1—Special telegram—A revision of the checkers' reports on the 500-mile race of Tuesday has brought about a change in the standing of the ten prize winners. After going over the sheets in a session which lasted for more than 24 hours, the officials this morning announced that Joe Dawson in the Marmon had been put in fifth place. This is the only change announced so far and the officials now are trying to discover who is entitled to ninth and tenth positions. Placing Dawson fifth shoved down the others so that the order of the first eight now is Harroun, Mulford, Bruce-Brown, Wishart, Dawson, de Palma, Merz and Turner. By the original report Dawson was charged with not finishing. On his supposedly last lap he had engine trouble which prevented him from going on to the tape. So far official times have not been given out.

American grand prix road race at Savannah last fall—David Bruce-Brown in the Fiat. Between first and third there only was a difference of 10 minutes 21 seconds, surely the most remarkable finish ever recorded in a race at such a distance.

The other men in the prize money were the Mercedes driven by Spencer Wishart, the Simplex of Ralph de Palma, the Merz National, the Turner Amplex, the Cobe Jackson, the Belcher Knox and the Hughes Mercer. Also running at the time the flag dropped denoting everything was over were eleven other cars, surely sufficient evidence that American cars are of staunch construction when all but eighteen can finish a grind of this sort. Those on the



HARROUN IN MARMON WINNING RACE



VIEW OF THE PITS AND THE TURN INTO THE SOUTH END OF TRACK

track to the end, outside of those in the money, included the Firestone-Columbus, Stutz, Burman Benz, Hall Velie, Fox Pope-Hartford, Marquett McFarlan, Hearne Fiat, Wilcox National, Delaney Cutting, Inter-State and Endicott Cole.

Eighty thousand people saw the sensational spectacle, and despite the fact it took nearly 7 hours to run the race no one had left the grounds up to the time Harroun got the final flag. The gate receipts, although not announced, must have run close to \$125,000. Of those present, 50,000

were seated, while the others either were standing or in cars parked in and about the grounds.

Accidents in Race

The race was not run without accidents, but outside of one mechanic being killed, the mishaps were not serious. Samuel Dickson, mechanic for Arthur Greiner, met death early in the race when the Amplex lost rim and tire in the backstretch. Greiner himself suffered a bruised arm and other injuries, while the other accidents were of rather a trifling nature. Dave Lewis, Grant's helper on the Alco, had a leg broken when the Lozier hit the Disbrow Pope-Hartford; Harry Knight and his mechanic, John Fuller, were injured in a mixup in the homestretch; C. L. Anderson, Jagersburger's mechanic, was bruised in the same accident, and Bob Evans, mechanic for Tower in a Jackson, sprained an ankle jumping from the car.

Race Hard-Fought One

But the race proper was a grand spectacle, a bruising fight from start to finish, with a delightful uncertainty as to the winner until the yellow Marmon glided over the tape and the packed grandstands acclaimed Ray Harroun the hero of the day. Many had looked for a runaway race, with the winner so far in front that interest would be lost before the fourth century was turned. Not so, however. Harroun, Mulford, Bruce-Brown, Wishart and de Palma always were there fighting for the front like a hungry dog over a bone. Nearing the end of the struggle the interest was intense indeed. Harroun was in front, but by so narrow a margin that the least slowing would drop him back. Any one of the other four had a chance and at one time first, second and third were in the same lap. The Fiat was worrying the Lo-



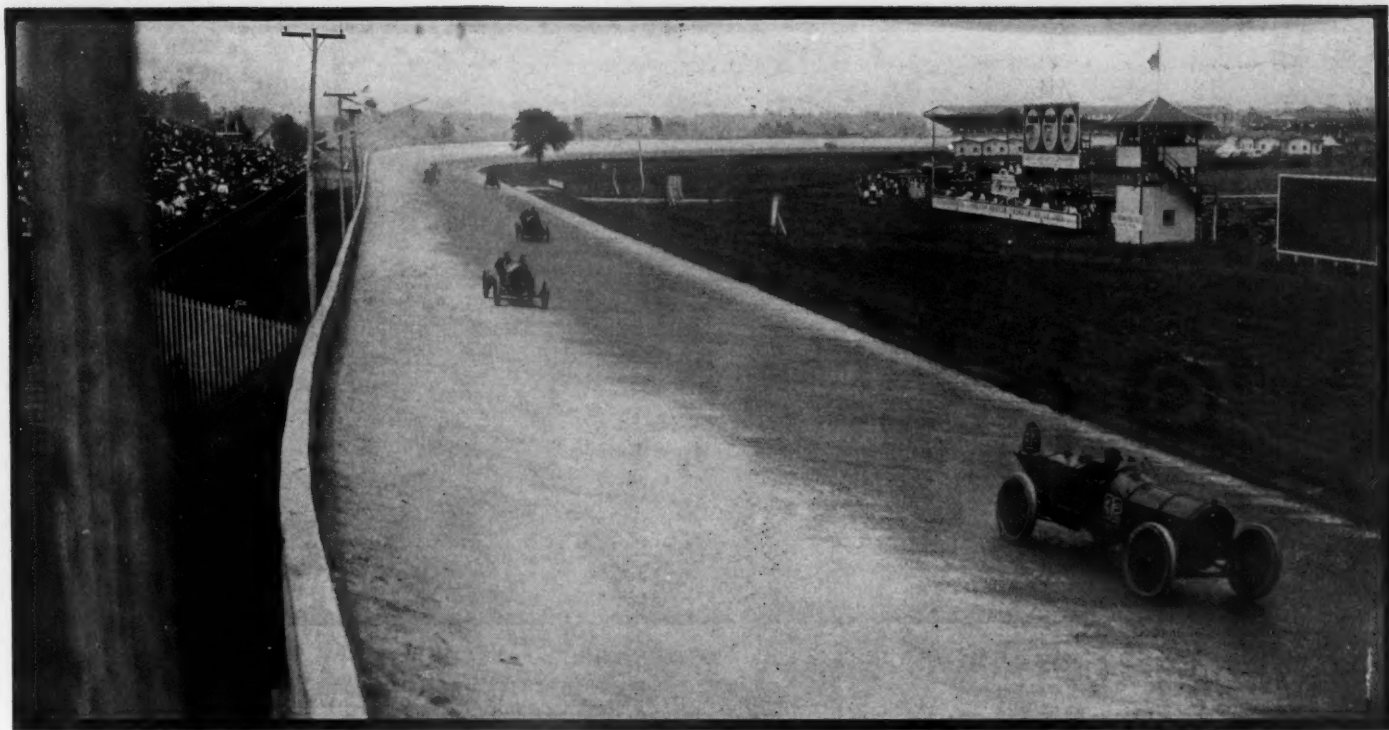
CYRUS PATSCHKE, HARROUN'S RELIEF



RAY HARROUN, MARMON DRIVER

zier at all times and it was see-saw between the two for the position of runner-up. One time it would be Bruce-Brown second and the next time the score would go up the winner at Elgin would hold the place. At the end there was some confusion regarding the scoring and many left the grounds under the impression the Fiat had finished second. Mulford, however, had the honor by 4 minutes 43 seconds.

Had it not been for tire trouble the finish undoubtedly would have been much closer and that last lap would have been



A BRUSH DOWN THE HOMESTRETCH, WITH HARROUN IN FOREGROUND

a hair-raising affair. All the way through Mulford had been fighting the puncture demon, having no fewer than fourteen tire changes charged against him, and on the one hundred and ninety-third lap, with only seven more to go, a flat tire developed which made him run on the rim to the pit for quite a distance. It required 2 minutes 30 seconds to make the change and straighten the rim, and in the meantime Harroun was steadily pulling away. The Marmon sidestepped the tire trouble and in the 500-mile race changed only three

times, all on the one wheel. At the end the car had on three of its four original tires.

The gates to the park were opened at 6 o'clock in the morning, and hardly had ingress to the grounds been afforded than the spectators began to crowd in. By 8:30 o'clock the special train of the Chicago Motor Club pulled in, at which time there was a crowd at the track that would have been sufficient for an ordinary race meet. Drivers and their mechanics had their cars out early, putting on the finishing touches and preparing for the speed battle. The officials checked up the field and it was found that of the forty-six original entries just a half-dozen were out. The two Falcars were scratched because of inability to get rear axles; the Van Gorder Lozier was pulled out because of the accident to the driver on Saturday, while three others failed to qualify in the trials which required 75 miles an hour as the badge of eligibility. The three were the No. 22 McFarlan which Fred Clemens was to have driven; the No. 40 Velie on which Arthur Gibbon was pilot, and No. 43 Cole, which had Jenkins for a driver.

Few Changes Among Drivers

There were few changes among the drivers at the last moment. Marquett was substituted for Bert Adams, while Arthur Greiner took the Amplex which Jones was to have driven and which is the same car in which Horan ran into the bank in practice, breaking his leg. Louis Chevrolet had figured some on getting into the race with a third Marquette-Buick, which would have required the consent of the other drivers. At the last minute Louis decided not to try it and contented himself with the position of relief driver for his brother, Arthur. M. Basle came in also as relief for



RALPH MULFORD IN LOZIER

his brother, Charley, but never had a chance.

These preliminaries settled, the track was cleared in order that Bob Burman might be handed his speed king title and presented with the crown offered by the Firestone Tire and Rubber Co. for the straightaway records in Florida. The crown was a most elaborate affair and the record-holder looked embarrassed when he was handed the crown and Referee Pardington made a speech eulogizing the performance of the Benz driver. Burman felt



DAVID BRUCE-BROWN, FIAT



RAY HARROUN, IN SIX-CYLINDER MARMON, HERO OF THE DAY

particularly happy anyway because of the addition he made to his record collection yesterday. Officially timed, he went the ¼-mile in :08.16; the kilometer in :21.40, the ½-mile in :16.83 and the mile in :35.35, all of which formerly were held by Barney Oldfield. In these dashes Burman drove the Blitz Benz.

Clearing Decks for Action

Handing Burman the crown left the decks clear for action and preparations were rushed to stage the big show, the 500-mile race. All the details had been carefully rehearsed before—how Carl Fisher was to set pace for the first lap, which was to be a slow one, while the drivers were getting their position, and as they crossed the tape the second time the race was to be on. There wasn't a hitch. The field was lined up five cars to the row, with the pole car as pacemaker for each squad and Billy Knipper in the Benz by himself at the rear. As if on dress parade the forty cars and the pacemaker made the

first lap, probably 100 feet separating each squad, and at the tape Fisher swung over to the pits, while an aerial bomb announced that the race was on in earnest.

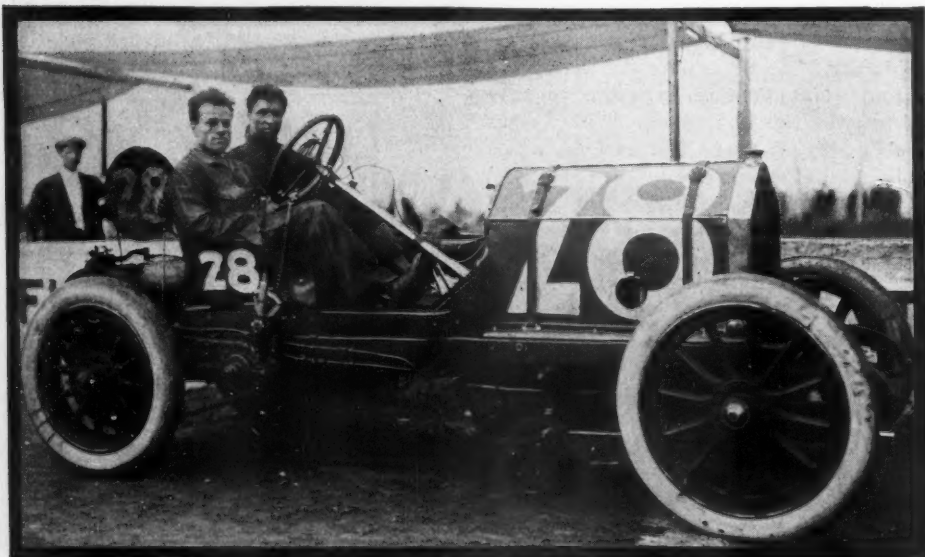
Johnny Aitken in the National assumed the aggressive at the start, being favored by a starting position in the first squad and it was his blue car that led at the end of the first round, with Harry Endicott in the Inter-State right at his heels. Wishart in the big Mercedes was fourth, but he didn't stay there long. He collared Aitken easily and at once went into a lead that made the crowd feel that the crown of favoritism that had been placed on the driver of the German car was not misplaced. Wishart had the front of the flock at the first 10 miles, with Aitken runner-up and the Knox third. By this time the field had settled down. Wishart and Belcher in the Knox were the leaders at 20 miles and Bruce-Brown had worked up to third. Before leaders could be announced again the first accident in the race oc-

curred. In the thirteenth lap the Amplex came to grief. Greiner had just swung into the backstretch when tire and rim came off. In the resulting smash Mechanic Dickson was killed and Greiner injured.

Knox Shows in Front

Belcher in the Knox had been making good use of his position up in front and at the 30-mile post he had ousted Wishart, while Aitken had run into second and Bruce-Brown had dropped to third. At 40 miles Bruce-Brown had worked to first and those strung out in his immediate rear were de Palma in the Fiat, Aitken in the National, Belcher in the Knox, Dawson in the Marmon, Mulford in the Lozier, Bragg in the Fiat, Wishart in the Mercedes, Tetzlaff in the Lozier and Grant in the Alco. The big fellows had settled into their stride and the battle was on in earnest.

Shortly after this Bragg in the Fiat came to grief, a broken piston ring putting the Italian car out of commission and making a spectator out of Bragg. At 50 miles Aitken was the leader, with Bruce-Brown chasing him and at 60 miles de Palma had the post of honor for the first and only time during the day, Bruce-Brown being his pursuer. De Palma enjoyed his position only for a brief spell, when he was forced back by the grand prix winner who then and there made a bold stab to land the race. From the 70 to the 180-mile mark it was Bruce-Brown's number that occupied the premier position on the score board and it looked bright for the New Yorker. Back of him the field was switching about. De Palma was second at 70 and 80 miles but at 90 the two white Loziers had woven their way to the front, Tetzlaff being in second place and Mulford third. At the century Mulford was leading Tetzlaff for second place. Mulford stuck there to 140 miles, when de Palma worked up. Just previous to this a most formidable candidate for the honors, Grant in the Alco, was put out, a burned out



AS BRUCE BROWN, FIAT, LOOKED AT THE FINISH



RALPH MULFORD, LOZIER, FELT LIKE CONTINUING THE LONG GRIND

connecting rod bearing at 130 miles forcing the Vanderbilt cup winner out of the contest.

Patschke Relieves Harroun

At 150 miles Harroun in the Marmon had worked to second place, just ahead of Mulford, but 10 miles farther on Harroun concluded to take a rest, so he turned the wheel over to Cyrus Patschke, his relief driver. Patschke immediately got down to business. He gave relentless chase to Bruce-Brown and before he gave up the car to Harroun after 100 miles he had placed the Marmon in the lead, after which it never was headed. Brown, Mulford, Wishart and de Palma were not disheartened by this, however, and kept everlastingly at it. They switched about positions somewhat, but it always was Brown and Mulford who were on the heels of the leader.

By this time the crowd had forgotten the accident in the thirteenth lap and had settled down to enjoy the race, when there came a crash in the homestretch that looked more serious than it really was. Tetzlaff and Disbrow, each with a soft tire, were coming into the pits and had just passed under the bridge spanning the track when the Pope skidded because of a blowout and Tetzlaff smashed into him. The Lozier ran into the soft dirt on the side and tipped over. Tetzlaff escaped unhurt, but his mechanic, Dave Lewis, emerged from the mixup with a right leg broken near the hip. Disbrow and his helper were unhurt. At the time Tetzlaff was in his fiftieth lap and Disbrow in his forty-sixth and going good.

On the eighty-first lap of the No. 18 Fiat another serious accident was narrowly averted. Shortly before Hearne had retired for a rest and Parker had taken the wheel. The Fiat was running wide and was just approaching the bridge on the homestretch when the steering gear broke, leaving the two front wheels uncontrolla-

ble. The car skidded into the protecting bank on the outside and no one was hurt. In order to get to the pits the mechanic had to run along one side of the car and Starter Wagner on the other side guiding the wheels while Parker drove. The car reached the pits without further disaster, where it soon was fixed up and the race resumed.

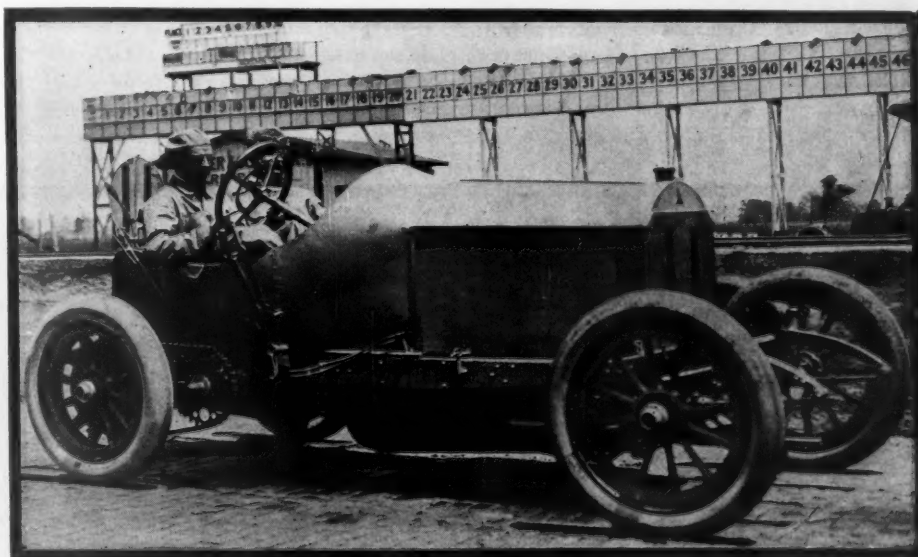
Three Cars Put Out

Three more cars—Herb Lytle's Apperson, Knight's Westcott and the No. 8 Case which Jagersburger was driving—were put out of commission a little later and it is a wonder some one wasn't killed. Jagersburger in the Case was running slowly in the center of the track opposite his pit, coming in because of a broken tie-rod. Foolishly his mechanic attempted to jump out. He stumbled and fell, the rear left wheel passing over him. Jagersburger stopped and Starter Wagner immediately got busy flagging the others to look out. Knight in the Westcott saw the signal and

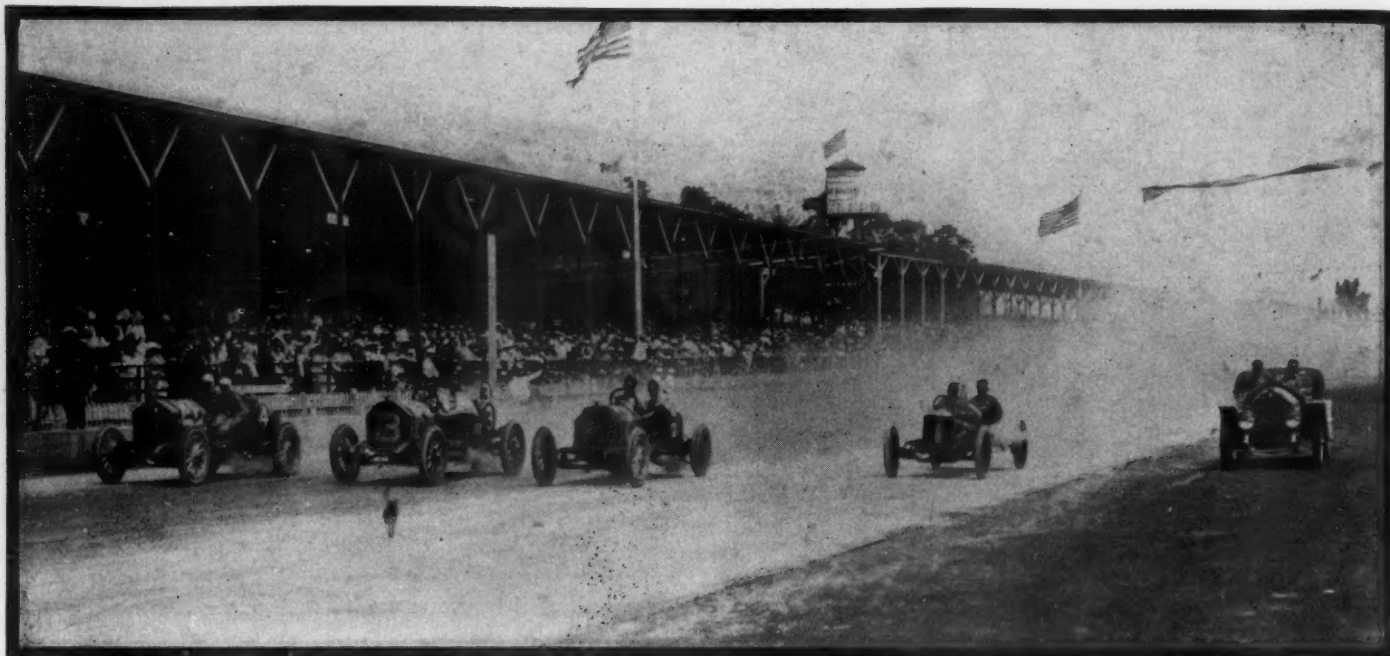
attempted to cut in between the Case and the pole. Just then he skidded and his car slid over into the Apperson which was standing at the pit. Lytle had just started to climb into his car and Edgar Apperson had hold of the starting crank to turn over the motor. Lytle jumped into the pit and escaped easily, and the maker of the Apperson also was unhurt, although he doesn't know how he got away. The crash upset the Apperson and put both it and the Westcott out for keeps. Knight and his mechanic were bruised somewhat and a spectator was hit in the face by a flying bolt.

Sand Put on Track

While all this was happening Harroun and his rivals were clipping off a fast pace. The track was getting slippery and foot by foot the dark line of oil was creeping out over the track until it was close to the outside edge. The drivers were cautious and took the turns gingerly, while there was considerable skidding.



WISHART, MERCEDES, WHO WAS FACTOR EARLY IN RACE



REAL START OF RACE—PACEMAKER FISHER DROPPING OUT AT PITS

At half distance, 250 miles, the distance had been covered in 3:20:29, beating the Lozier's previous record of 3:26:15, made at Atlanta. The order at this point was the Harroun Marmon, the Mulford Lozier, the Bruce-Brown Fiat, the Wishart Mercedes, the Dawson Marmon, the Turner Amplex and the de Palma Simplex. At this point the management started sprinkling sand on the track because of the oil and the effects of it were apparent immediately. The time became faster and drivers became bolder. That first turn no longer held any terror for them apparently, for often bunches of three and four cars would race down the stretch fighting to be first in the turn.

De Palma was the chaser of the Marmon at 260 miles and again at 270, but after that he dropped back a bit, allowing Bruce-Brown and Mulford to get into the limelight. Just about this time there was another mishap in which Bob Evans, mechanic for Jack Tower in the Jackson, was injured. Tower had swung into the backstretch and ran up back of another car with a flat tire. In order to avoid hitting it, Tower swung onto the grass. Evans, thinking he would hit the wall, jumped and

sprained an ankle. Strang went out in the seventieth lap with a broken tierod and thereupon the company officials pulled out the third Case, not caring to risk any injury to Jones. Johnny Aitken pulled out with his National at 330 miles with a broken connecting rod.

Five Battle for Race

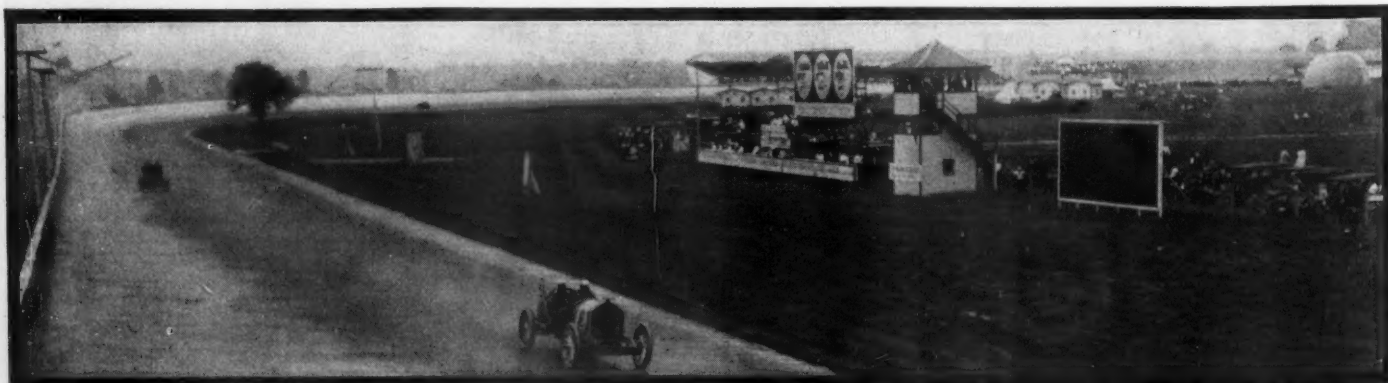
From this point on there was nothing but tire trouble to distract the minds of the spectators from the race. The fight for the money had become a grim one among Harroun, Mulford, Bruce-Brown, Wishart and de Palma and a stop at the pits meant a good deal. At 400 miles the order was Harroun, Mulford and Bruce-Brown.

The crowds realized at 450 miles that it really was a race. They forgot their morbid curiosity in accidents and studied the score boards. They had gotten the hang of the scoring and knew that at last there was something definite about the race, a struggle among stars for a kingly purse and that at least five of them had a chance. Grim little Harroun, riding alone in the yellow car in which he won the Schebler cup last year, with no mechanic to help him, was a cool, confi-

dent leader. Mulford, fighting tire trouble, was straining every nerve to pick up some of the ground between him and Harroun, while Bruce-Brown was seesawing with the Lozier man. Harroun was back of Mulford perhaps a quarter of a mile nearing the end—not in position in the race but in position on the track—and there he stuck. The Marmon seemed to have barrels of speed but Harroun was not using it all. He knew if he could hold his place he was safe and he measured speed with the Lozier notch by notch.

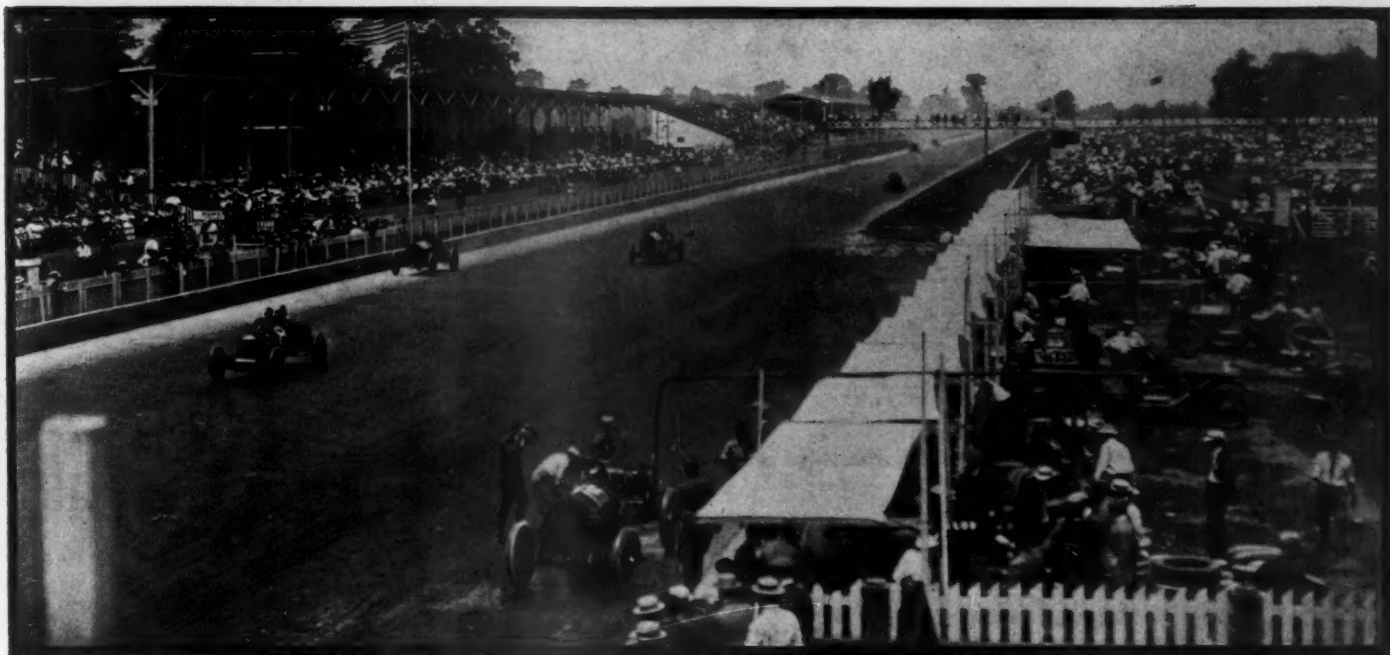
Flag for Harroun

Finally there came the green flag denoting the last lap and one could fancy the eagerness with which the speedway champion started on his final round. There was still a nervous strain, for the least little thing going wrong might force a stop at the pits which would enable Mulford to race to the front and grab that \$10,000. But nothing like that happened. Smoothly and easily and without any apparent effort, the yellow car shot along, the checkered flag dropped and Harroun was the winner. Once again he encircled the track, then swung into the paddock. As he stepped from the car his legs were



WILCOX IN THE NATIONAL IN FOREGROUND,

APPROACHING OVERHEAD BRIDGE



BELCHER IN THE KNOX MAKES A STOP AT THE PITS

weak and wobbly, he looked wan and worn and his voice trembled as his friends crowded around him with congratulations.

Then the eyes turned again to the track and everyone wondered who would be second—Mulford or Bruce-Brown. Again nothing happened and the two cars finished, the Lozier second and the Fiat third, both drivers having driven the entire race without relief. Like a husky giant Bruce-Brown stood around and watched the rest of the race, while Mulford at once busied himself helping his pit attendants pick up things.

Hard Luck for Dawson

Joe Dawson came in for his share of attention then. Running fourth, it looked as if the Marmon would place another. Dawson had one more lap to go and that lap meant \$2,000 to him. It seemed easy money, but the Marmon four never got around. Dawson had bumped another car and poked a big hole in the radiator of his machine. He stopped for oil but did not put any water in because he figured the leaky radiator would not hold it and that it would be futile. He hoped to make that last lap on oil alone but the

experiment failed. The engine ceased and Dawson was down and out, just like he was at Atlanta last year when a substantial piece of money awaited him in the Coca Cola race if only he could go one more lap.

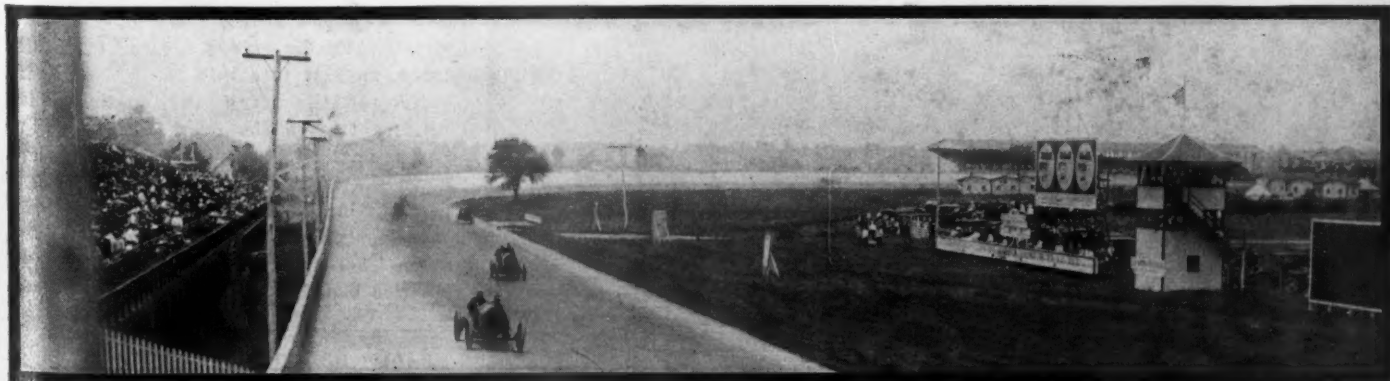
This let Spencer Wishart shoot into fourth place and after Wishart came de Palma. The five men who had made the race so interesting to all had finished and each was to get a fat bit of prize money. Then came those who had been battling in the second squad—Merz in the only surviving National, Turner in the Amplex, Cobe in the Jackson, Belcher in the Knox and Hughes in the Mercer, making the ten who get the golden plunder. Two other cars besides these were counted by the judges—the Firestone-Columbus, which was ranked eleventh, and the Stutz, which was placed twelfth. Others there were who still were running but the officials decided they had enough and so they closed their books.

Race Grand One Throughout

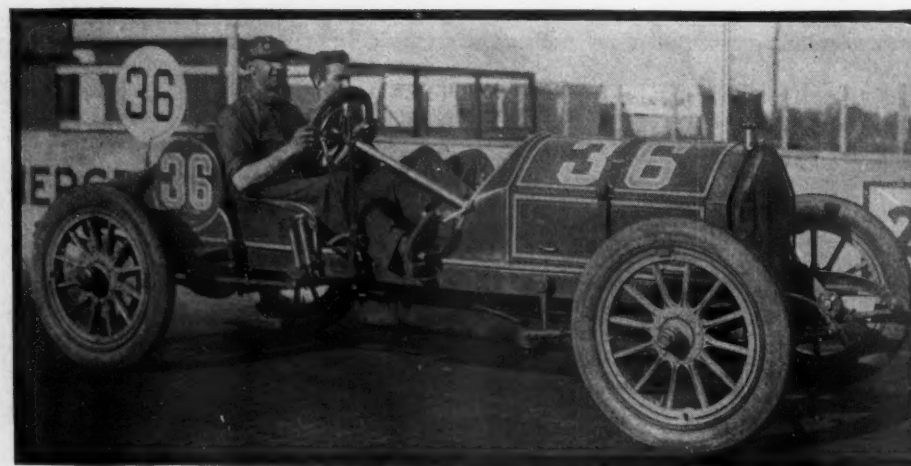
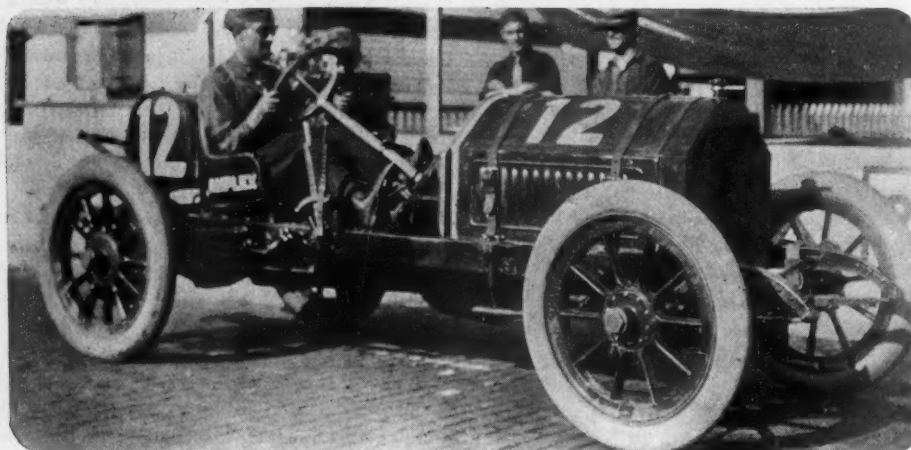
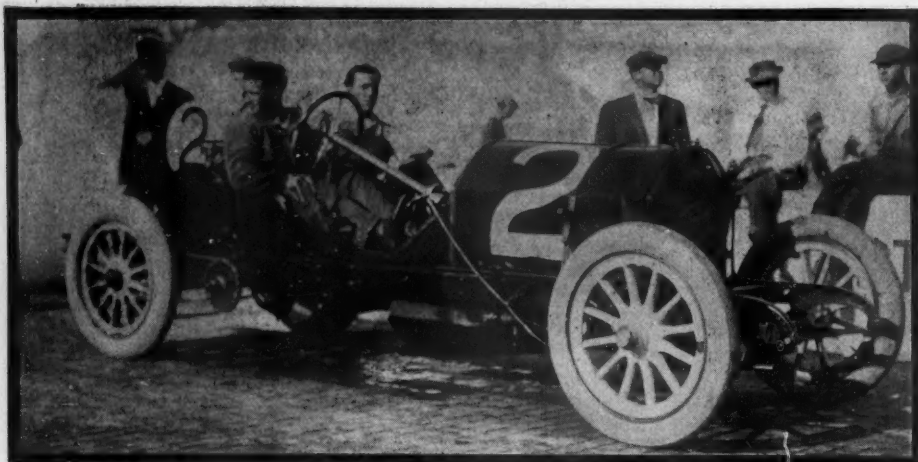
It had been a great race and a grand struggle. The crowd had had a run for its money. It had seen the stars of America battle in a long grind in which

stamina was almost as big a factor as speed and yet more than half of them had stood the gaff. The race was marked by little mechanical trouble. Engines had stood up amazingly well and the break-ages mostly had been steering knuckles and tierods, crystallized by the pounding over the bricks. There had been tire trouble galore, though, else the race undoubtedly would have been closer than it was, if such a thing were possible. There had not been as many accidents as had been expected and the injuries received by mechanics could mostly be traced to the fact that the second man in the car has hard work to remain cool in an emergency. He wants to jump and he often does, with disastrous results.

There was considerable disappointment at the finish because of the inability of the timers to have their report ready. No one tonight could learn other than that twelve cars had been caught as finishing and that the time of the three first in could be had. Harroun's was given as 6 hours 41 minutes and 8 seconds; Mulford's as 6 hours 46 minutes 46 seconds and Bruce-Brown's as 6 hours 51 minutes 29 seconds.



NO. 10 STUTZ IN IMMEDIATE FOREGROUND, A CAR THAT MADE GOOD SHOWING



Resume of Performances of Cars at Indianapolis

SO far as the public was concerned, that is, that public that goes to a race to see cars perform, the honors weren't all to the fastest cars. The medium-powered machines came in for a big share of the honor by their very consistent running. The performance of these cars was a revelation to everybody. No one expected that they would stand up so well; fortunately they surprised their friends as well as enemies. Before the start of the race wagers were being made that ten cars would drop out in the first 100 miles and that when the race was half over more than half of the cars would be out. This was far from the case, because when the race was 100 miles gone only one car was eliminated and that was Greiner in No. 44 Amplex, the two-cycle machine which was wrecked by throwing its demountable rim. With this exception all of the other cars were running well, there was little if any heating, and all of the stops that were made for changing tires.

Weeding Out the Cars

The greatest elimination of cars came from 100 miles to 300. The first serious trouble that showed itself was due apparently to crystallization of parts. Steering knuckles, crankshafts and connecting rods were giving way. The grandstand spectators had three examples of steering knuckles or tierods breaking on the home stretch. The first was Fiat car No. 18, driven at the time by Parker. The knuckle gave way just at the start of the home stretch. Parker guided the car for a distance, then it tore into the grass at the outside of the track and continued its perilous trip to the overhead bridge before it finally was stopped. It was pushed down the track to the repair pit, a new part put in and taken on the course again with Hearne at the wheel. It finished the race. Those who watched the preliminary practice had discussed the matter of crys-

RALPH DE PALMA IN SIMPLEX
H. ENDICOTT IN INTER-STATE
TURNER IN AMPLEX
HUGHES IN 36 MERCER

Analysis of the Mechanical Mishaps During Race

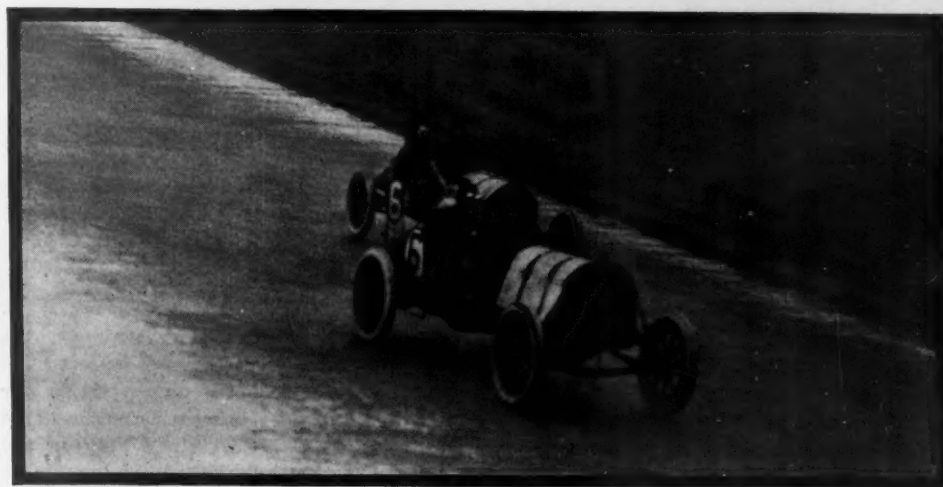
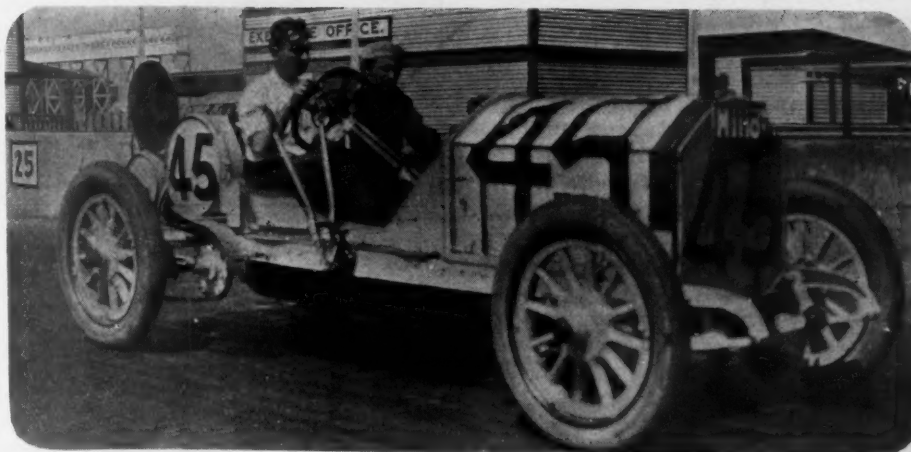
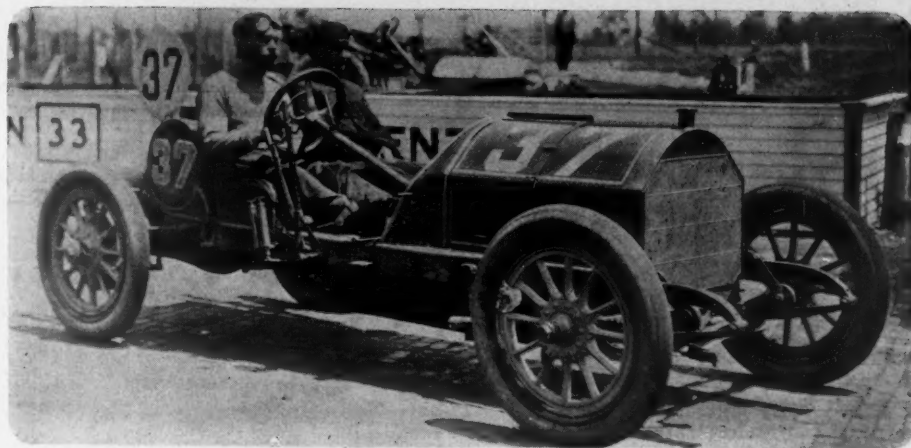
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tallization of steering parts and it was stated that many of the steering parts in this car were used in previous races. It added one more bit of evidence to the fact that parts subjected to great and incessant vibration in a racing car should be changed before subsequent races.

Steering Parts Crystallized

The Case cars suffered from crystallized steering parts. Strang, driving No. 1, had a tierod let go coming down the home stretch. The car dashed into the dirt at the inside of the track, but Strang piloted it free from the fence until it was stopped not 30 yards from the end of the grandstand repair pits. No. 8 Case had a steering part crystallize coming down the home stretch. The car swerved from side to side but finally was stopped in the middle of the course just at the lower end of the grandstand and opposite the repair pits. The mechanic jumped out to assist in pushing it to the pits when the mixup that eliminated two other cars happened. The No. 7 Westcott driven by Knight was coming down behind the Case and to avoid striking the Case mechanic it was necessary to turn left and go between the Case car and the pit. In doing this a sudden application of the emergency brake brought a skid, so that in passing the Case the Westcott struck the Apperson standing at its pit and upset it, putting it out. The Westcott also was eliminated. The Case car withdrew.

Blowouts Play a Part

Accidents were responsible for two other cars being put out of the running, blown out front tires being largely responsible for the trouble. No. 34 Lozier, driven by Tetzlaff, was coming down the home stretch holding the inside. He had a blowout front and had pulled to the inside of the course so as to come into the pit. Disbrow, driving No. 5 Pope special, was following him and he, too, had just had a blowout and was also going to cut to the



FRAYER IN FIRESTONE-COLUMBUS
BIGELOW IN 37 MERCER
BOB BURMAN IN 45 BENZ
FOX IN 6 POPE-HARTFORD



CHARACTERISTIC SCENE AT PITS, WITH MERZ' AND WILCOX'S NATIONALS STOPPING

inside, Tetzlaff pulled in in front of him, the Pope special spring horn caught the Lozier and turned it around on the track and then the Lozier turned over in the dirt on the side. Both cars were out. This made five cars eliminated by accidents.

Crankshafts Break

But the crystallization of parts already referred to reached further than steering parts. It attacked crankshafts and other parts. Aitken driving No. 4 National, a special racing machine, broke a connecting rod and was eliminated. Arthur Chevrolet piloting No. 16 Buick Special broke a crankshaft. Later in the race Caleb Bragg, driving No. 39 Fiat, was eliminated with a broken piston. Charles Basle, driving No. 17 Buick special, withdrew because of a cracked crankcase.

There were two eliminations due to lack of lubricating oil. The first of these was Grant in No. 19 Alco. He burned out a bearing at 125 miles and was out. The other case of lack of lubrication was Dawson, driving No. 31 Marmon. His case was pathetic. He had finished the second last lap, only one more circuit of the course remained. He stopped to put in oil. The motor was hot, due to lack of water because of a punctured radiator. The oil, however, came too late and he was not able to complete the circuit and so went his chances of earning \$2,000 which would have been his for running in fourth place.

This is a small list of breakdowns out of a field of forty cars and speaks volumes for the present American motor car. It is not a distant memory to the times when motor troubles and a score of other ones kept the grandstand pits filled, but such was not the case today. It should not be assumed from this that there were not any mechanical troubles outside of these. Several of the cars had minor troubles. Basle had a steering gear get tight on his Buick and it had to be loosened. There were many cases of slight



LOOKING NORTH IN INFELD FROM THE PRESS STAND

troubles that cost some of the cars 2, 3, 4 or 5 minutes.

Starting the Field

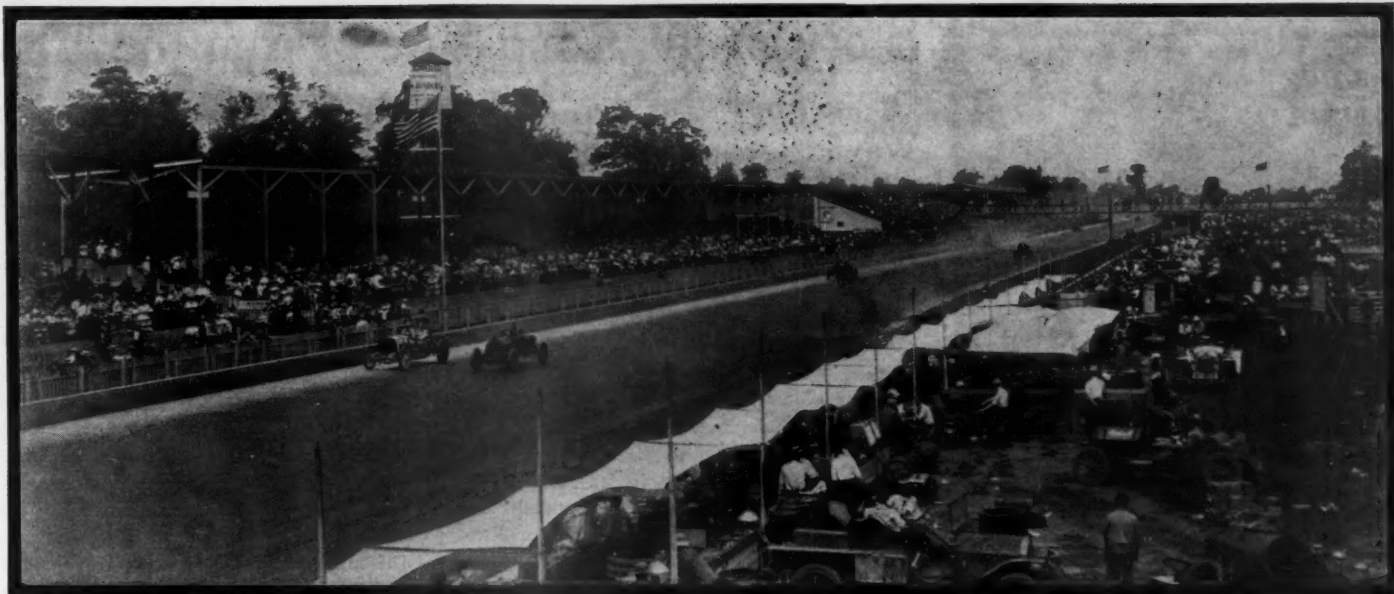
One of the important details of the race was the starting of the cars, forty of which got away in good shape. The width of the track was such that perhaps a dozen could be lined up across it and so there would have to be three or four successive rows. To avoid this the cars were arranged in rows of five each, there being eight rows, one behind the other, with the cars in each as follows:

Pacemaker	1	2	3	4
5	6	7	8	9
10	11	12	13	14
15	16	17	18	19
20	21	22	23	24
25	26	27	28	29
30	31	32	33	34
35	36	37	38	39
40	41	42	43	44
45	46	47	48	49

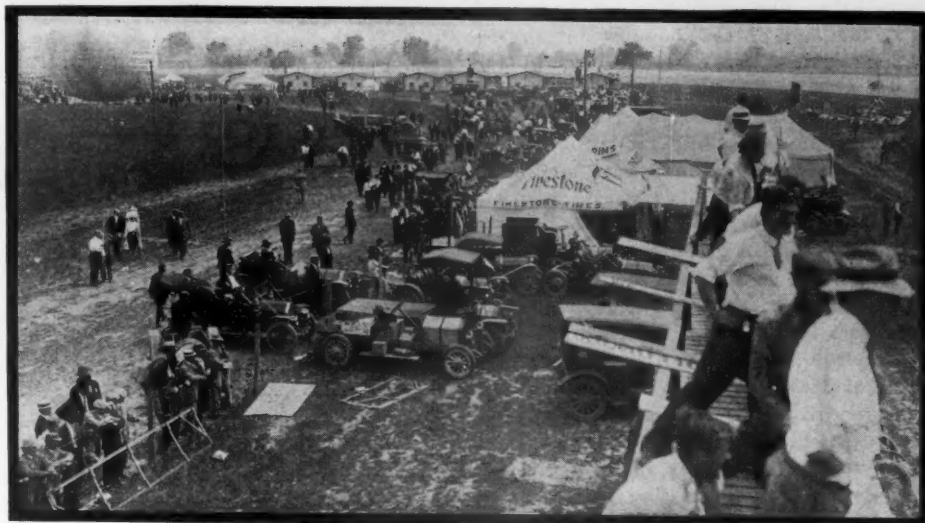
Carl G. Fisher acted as pacemaker and led the cars once around the circuit at a speed of 40 miles per hour. The left hand car in each line acted as pacemaker for the line and by this means a space of 60 or 100 feet was maintained between the lines. At the end of the first lap Fisher

withdrew and the race was on. This method gave the cars in the first line a big advantage over many of those in the back lines and when No. 46 crossed the line, No. 4, which was in the front line, was 1 mile in the lead. The start did not make any difference in the result because the big fight was between cars No. 28, 32 and 33, which, as it happened, were all in the same line and so started on even terms. This method of starting got away from the smoke nuisance which invariably takes place when a lot of cars are started at once.

Undoubtedly what saved many of the cars was the shock-absorber protection taken. Harroun on his Marmon Wasp used two sets of shock absorbers, that is, eight in all. With these the car held the track beautifully and there was not any of the pounding of the front wheels that was noticeable on several other cars. It also is a fact that the majority of those cars which did a great deal of pounding had steering gear troubles. The race could not otherwise but teach a few makers the



SCENE IN HOMESTRETCH, DARK PORTION SHOWING OIL ON THE TRACK



PADDOCK SCENE SHOWING ACCESSORY HEADQUARTERS

necessity of reducing vibration to a minimum. It is just as important to reduce vibration as it is to have good tires.

Drivers Were Prepared

Compared with many former track and road races it was interesting to note the freedom from gasoline leakages, spark plugs, etc. The long period of training on the track had brought out many of the weaknesses, so that it is problematical if ever before did cars enter a race better prepared. It could scarcely have been better, excepting in a few cases, as already mentioned. Not only were the cars well prepared but the drivers had studied the track and knew what parts were smoothest and wore the tires least. The smooth qualities were nearly the undoing of many about the middle of the race, before the management started putting sand on the course. It was so slippery that the drivers could not open the throttle wide on the back stretch; if they did the rear wheels wanted to get in front of the forward ones. After the sand was applied slipping was over and the speed average increased.

Naturally because of the bonuses offered by the carbureter concerns, there was considerable interest displayed in the equipment on the cars that finished in the money. The extras in this line run into a considerable sum. The Rayfield carbureter purse totaled \$3,000, of which \$2,000 was to go to the winner provided he used the product of the Findeisen & Kropf Mfg. Co.; \$500 to second; \$300 to third; \$200 to fourth. Wheeler & Schebler hung up \$2,500, which was to be given to the winner if he had on a Schebler carbureter. The Columbia Lubricants Co. offered \$1,000, divided \$500, \$250, \$150 and \$100 if Monogram oil was used by first, second, third and fourth. The Remy magneto purse amounted to \$1,000; the Red Head spark plug fund to \$400, divided \$250, \$100 and \$50; the Dorian rim purse, \$250, \$150 and \$50, and the Splitdorf magneto purse, \$3,100, split \$1,500, \$750, \$500, \$250 and \$100.

As reported, Harroun's Marmon was fitted with Firestone tires, Remy magneto and Schebler carbureter, so he realized a

small fortune, when it is remembered he cashed \$10,000 for being first. Mulford carried a Rayfield carbureter and Bosch magneto. Bruce-Brown had on a carbureter made by the Fiat people and used a Bosch magneto. Wishart used a Mercedes carbureter and a Bosch magneto. De Palma drove with a Simplex carbureter and Bosch magneto. Merz in the National had on a Schebler and a Remy, while Turner in the Amplex pinned his faith to a Schebler and Bosch. Cobe in the Jackson had the Schebler-Splitdorf combination, while Belcher in the Knox used a Rayfield carbureter and a Bosch magneto. Hughes in the Mercer, last one in the prize list, had on a Schebler carbureter and a Bosch magneto.

Record of the Drivers

Just how much Cyrus Patschke will get for assisting the Marmon to victory is not known, but certain it is he should not be forgotten when the division of the spoils takes place. Patschke contributed largely to Harroun's success. When he relieved the little fellow the Marmon was chasing Bruce-Brown and when he was ready to step out the Marmon had a good lead. Harroun perhaps was wise in taking the rest he did, for he has not the robust constitution some of his rivals have. Indeed, it hardly is likely he could have continued much farther.

On the other hand, Mulford and Bruce-Brown apparently were in prime condition, neither man having suffered from the long grind. Both of them had gone the entire distance and evidently could have kept on for some time. Wishart showed the strain of the long drive and at the end was nervous and inclined to be morose. He, too, went the full route, as did happy-go-lucky de Palma.

Although it was within the province of Referee Pardington to order drivers relieved, he did not find it necessary to exercise this right. In fact few of the drivers show any effects of the long race.



BURMAN WEARING FIRESTONE SPEED CROWN

OUT of the forty cars that started, seventeen dropped out and twenty-three were running at the finish of the race. The cars running at the finish were: Harroun's Marmon, Mulford's Lozier, Bruce-Brown's Fiat, Wishart's Mercedes, de Palma's Simplex, Merz's National, Turner's Amplex, Cobe's Jackson, Belcher's Knox, Hughes' Mercer, Frayer's Firestone-Columbus and Anderson's Stutz, in the order named, while Bigelow's Mercer, Burman's Benz, Knipper's Benz, Endicott's Cole, Hall's Velie, Fox's Pope-Hartford, Adams' McFarlan, Hearne's Fiat, Wilcox's National, Delaney's Cutting and Endicott's Inter-State were

Story of the Long Race From the Pits

Of the Forty Cars that Started Only Seventeen Fell By the Wayside—Troubles of Aitken, Strang, Knight, and Others Who Dropped Out—Why and When They Quit the Battle

hanging out for a chance finish to the race.

Johnny Aitken's National took the count in the one-hundred and twenty-third lap because of a broken connecting-rod. He was in eighth place at the time and running well, though he had made eight stops previously. Aitken's first stop was made for a right rear tire after a run of 50 minutes; 1 hour and 40 minutes later another stop was made to adjust spark plugs, and six minutes later he stopped for a right front and a left rear tire and a new magneto.

Three more stops were made for right rear tires at comparatively short intervals, while water and gas were taken on 8 minutes before the connecting rod broke and put him out of the running. Disbrow's Pope-Hartford was knocked out in the forty-fifth round, the loss of a tire causing him to skid sideways so that he was struck broadside by Tetzlaff's Lozier, which skidded badly in Tetzlaff's effort to dodge him. Up to this time Disbrow had made four stops. The first one was to take off the speedometer, the cable of which was dangling; the second to adjust the carburetor; the third to replace a left rear tire and the magneto, and the fourth to replace a right rear tire.

Knight Has Trouble

Harry Knight's Westcott met its Waterloo at the beginning of the ninety-fifth lap. Jagersburger's car was running wild because of a broken steering gear, and the mechanic fell in trying to get out. In order to avoid running over him, Knight applied his brakes and skidded so that he lost control. The Westcott crashed into the Apperson, which had been standing at the pits for adjustments.

Jagersburger's Case broke a steering rod in the eighty-seventh lap and was the fundamental cause of the crash between

the Westcott and the Apperson. This car had been doing excellent work up to this time, having stopped only once, 2 hours and 40 minutes after the start, for oil, water and gasoline and a right rear tire. **Close Call for Strang**

Strang's Case soon after had a narrow escape from a similar cause, so the Case driven by Jones abandoned the race following an order from the company officials. Strang's car made seven stops up to the time it dropped out. The first one was 54 minutes after the start for a right rear tire. The next stop delayed Strang a few minutes owing to the fact that a rim had become damaged by running without a tire, so that it was necessary to remove the entire wheel with a wheel-puller and replace it with a new one. The third stop was occasioned by trouble with the same tire, at which time the tanks were refilled with oil and gasoline. At 1 o'clock the fourth stop was made, at which time Strang was relieved by Ray, and a right and left front tire replaced. Three-quarters of an hour later another stop was required to replace a leaky radiator and another right front tire. The sixth stop was made at 2:27, a hole being drilled into the rear cylinder valve-chamber in an effort to stop a leak in the cylinder. When again in shape Strang chose to go as mechanic, and attempted to jump into the seat after the car had started, and was thrown to the pavement. He rose unhurt, however, and reached the seat in safety. Luck seemed to have deserted the Case outfit, however, and after a few laps more the steering rod gave out and the race was abandoned.

Arthur Chevrolet in the Buick, after burning up five tires in the first hour, was forced to give up the contest because of a broken crankshaft.

TABLE SHOWING POSITIONS OF SOME OF THE CARS AT 10-MILE

Finish	CAR No.	CAR	DRIVER	ORDER OF START	MILES																		
					10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190
1	32	Marmon	Harroun		7	6	8		10	9	8	7	6	5	4	4	4	4	2	2	2	2	1
2	33	Lozier	Mulford		10	9	7	6	5	4	4	4	3	2	2	2	2	3	3	4	4	3	3
3	28	Fiat	Bruce-Brown		5	5	3	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
4	11	Mercedes	Wishart	3	1	1	5	8	7	7	7	6	7	7	6	6	6	5	5	6	6	5	5
5	2	Simplex	De Palma	2	4	4	4	2	3	1	2	2	5	4	3	3	3	2	6	5	5	4	4
6	20	National	Merz																				
7	12	Amplex	Turner	7	6	8																10	9
8	25	Jackson	Cobe																				
9	15	Knox	Belcher	4	3	2	1	4	4	5	8	8	8										
10	36	Mercer	Hughes																				
	31	Marmon	Dawson		9	7	6	5	6	6	6												
	21	National	Wilcox																				
	4	National	Aitken	1	2	3	2	3	1	3	3	3	4	6	5	5	5	6	4	3	3		
	8	Case	Jagersburger	8																			
	34	Lozier	Tetzlaff				9	9	8	8	5	5	2	3									
	39	Fiat	Brogg					7															
	19	Alco	Grant					10															
	5	Lozier	Disbrow		8	10																	
	3	Inter-State	Endicott		9																		

The positions of the ten leading cars at the end of each 10-mile interval

Many Sufferers From Tire Troubles

Blowouts and Punctures Are Numerous—Broken Crankshafts Reason Some of the Cars Throw Up the Sponge—Crystallization Brings About Breakages in Steering Apparatus

Eddie Hearne's Benz made a short stop after a hard run of about 2 hours, at which time a shock absorber was tight-

ened. Half an hour later the second stop was made for gasoline and oil, and Lindenstruth took the wheel. The third stop

TIME OF THE LEADERS AT EACH 10 MILES OF RACE

Distance Miles	Leader No.	Make of Car	Elapsed time	10-mile time	Miles per hour	Second Position car	Third Position car	Fourth Position car
10	11	Mercedes	0:7:34	7:34	79.25	4	15	2
20	11	Mercedes	0:15:06	7:32	79.5	15	4	2
30	15	Fiat	0:25:07	10:01	60	4	28	2
40	28	Fiat	0:33:01	7:54	76.25	2	4	15
50	4	National	0:41:07	8:06	74	28	2	15
60	2	Simplex	0:48:56	7:49	76.5	28	4	33
70	28	Fiat	0:56:45	7:49	76.5	2	4	33
80	28	Fiat	1:04:40	11:55	75.75	2	4	33
90	28	Fiat	1:12:24	7:44	77.5	34	33	4
100	28	Fiat	1:22:16	9:52	60.25	33	34	2
110	28	Fiat	1:29:57	7:41	78	33	2	32
120	28	Fiat	1:37:43	7:46	77	33	2	32
130	28	Fiat	1:45:26	7:43	77.25	2	33	32
140	28	Fiat	1:53:18	7:52	76.25	2	33	32
150	28	Fiat	1:59:12	5:54	101	32	33	4
160	28	Fiat	2:07:00	7:48	76.75	32	4	33
170	28	Fiat	2:14:53	7:50	76	32	4	33
180	28	Fiat	2:20:51	5:38	109	32	33	2
190	32	Marmon	2:34:48	13:03	46.3	28	33	2
200	32	Marmon	2:43:41	8:59	66.75	28	33	2
210	32	Marmon	2:49:58	6:17	96	28	2	33
220	32	Marmon	2:58:39	8:41	69	2	28	33
230	32	Marmon	3:05:25	6:46	88.5	28	2	33
240	32	Marmon	3:13:01	7:36	79	28	2	33
250	32	Marmon	3:20:29	7:28	80.25	28	2	33
260	32	Marmon	3:32:10	11:41	50	2	33	28
270	32	Marmon	3:40:09	7:59	75	2	28	33
280	32	Marmon	3:50:18	10:09	60	28	33	2
290	32	Marmon	3:56:24	6:06	98.5	28	33	2
300	32	Marmon	4:03:24	7:00	85.5	33	28	2
310	32	Marmon	4:11:41	8:17	72.5	33	2	28
320	32	Marmon	4:21:37	9:56	60.5	33	2	28
330	32	Marmon	4:28:10	6:33	92	33	2	28
340	32	Marmon	4:36:10	8:00	75	33	28	31
350	32	Marmon	4:44:14	8:04	74.5	33	31	28
360	32	Marmon	.....	.....	.....	33	28	31
370	32	Marmon	4:59:48	.....	.....	33	28	21
380	32	Marmon	5:06:28	6:40	90	33	28	31
390	32	Marmon	5:14:25	7:57	75.5	33	28	11
400	32	Marmon	5:22:15	7:50	76.5	33	28	11
410	32	Marmon	5:32:05	9:50	61	33	28	31
420	32	Marmon	5:39:38	7:33	79.5	33	28	31
430	32	Marmon	5:47:23	7:45	77.5	33	28	31
440	32	Marmon	5:55:03	7:40	78	33	28	31
450	32	Marmon	6:02:45	7:42	77.7	33	28	31
460	32	Marmon	6:10:35	7:50	76.5	28	33	31
470	32	Marmon	6:18:18	7:43	77.75	28	33	31
480	32	Marmon	6:25:00	8:44	68.75	28	33	31
490	32	Marmon	6:33:00	8:00	75	28	33	31
500	32	Marmon	6:41:08	8:08	73.75	33	28	11

Editor's Note—The above times were those given on the official scoreboard, but in certain instances mistakes in timing seem to have been made. Sometimes these were slow and at other times abnormally fast, as for instance at 150 miles, 180 miles and again at 380 miles. Blank spaces at 360 miles indicate where timing apparatus broke.



**BURMAN TAKING BRAKE TEST BEFORE
START**

was made at 1:02 to replace a stud lost from a brace secured to the rear cylinder head, and 10 minutes after restarting, the crowd was given a thrill as the steering arm gave way on the home stretch, causing the car to run wild along the fence for about 100 feet. It was then brought to a halt within a few feet of a bridge that would have demolished the car had it been struck. The car was again brought to the pit and a new steering arm fitted after a loss of much time. Resuming the race, only two more stops were made up to the last one; one to change a right rear tire and take on water and oil and the other to change mechanics. Two hours before the race ended a broken

INTERVALS AS COMPILED FROM THE OFFICIAL SCORE BOARDS

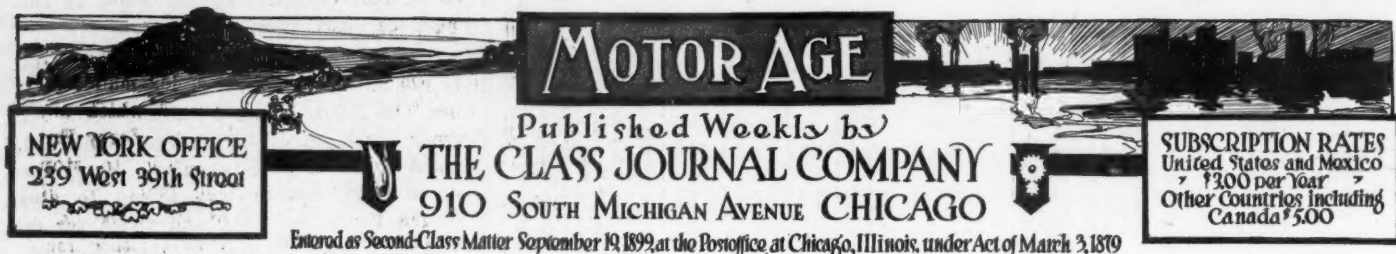
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When a car did not show in the first ten its position is not given

Caleb Bragg had piloted his Fiat 1 hour and 1 minute without a stop, when a broken crankshaft caused his withdrawal.

ROUNDING INTO HOMESTRETCH

2



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The Matter of Bridges

WHEN man walked to get from place to place the matter of roads did not bother him very much. He did not have to waste time figuring on whether he should use macadam, gravel or just plain dirt for surfacing. Even a grassy sward was good enough for him. Then he became tired of walking and the horse was impressed into service. Even then it mattered little about roads. Then came the wheeled vehicle and this started a demand for highways that would make easier riding than bridle paths. The grains in the hour glass kept falling until time brought in the bicycle and the hosts of wheeled knights became insistent in their demands for road improvement. It was a natural transition from the bicycle to the motor car, and by this time the good roads snowball had assumed gigantic proportions. It still continues to grow, and now it is of a size at which the whole world marvels. The good roads era is at hand and the bicycle and the motor car are responsible.

GRANTED this, there has been another change that a few years back was not even considered by the advocates of highway improvement. That is, the advent of the motor truck has or will revolutionize matters with highway commissioners. They have been building their thoroughfares for heavy motor cars and have not noticed the shadow thrown by the big trucks. Now they find that their bridges are too light in many cases, that the roads themselves will not stand heavy commercial traffic, and that there needs must be a shakeup in the art of road-making. This is particularly true of bridges, but fortunately for the trade the American road commissioners see things in a different light now. They no longer are the prejudiced lot they used to be. They realize that business needs soon will send scurrying throughout the country an army of commercial motor vehicles, and when the intercity traffic becomes a settled fact then the roads must be right to stand it.

FARMING communities are going to feel the strain of fixing these bridges, or rather replacing them, and the farmers themselves will not be able to charge this up to the motorists because of the antediluvian methods they have followed in the past. No longer will it be possible to put up rickety, wooden makeshifts or to use pipe when there ought to be a bridge. The pipe is a cheap affair at best, and a heavy truck running over the road under which it is placed is liable to crush it even though it is underground. County commissioners therefore are urging road-builders to realize that the old-fashioned policy is a case of penny wise, pound foolish; that it is far better to put in a substantial cement or iron bridge at the start rather than to try something cheaper and then have to replace it in a couple of years. Solid one-piece cement bridges are most favored by the progressive commissioners, who point out to those over whom they have jurisdiction that it is foolish to economize in this matter. Many are realizing this fact, and the time of good bridges is at hand.

ALL of which reminds one of the famous saying of the Massachusetts highway commission a few years back which went on record by declaring that if the present roads are not good enough to stand motor traffic, then the duty of the commission is to put them in such shape that they will. If similar bodies in other states took this same broad view of the situation it would not be long before this broad country of ours would be latticed with highways that would stand the closest criticism.

Modern Motor Legislation

MOTORISTS may come out of the cyclone cellar now, for the open season for rabid legislation as it pertains to the use of cars is about over. There are only two or three legislatures still in session, and with but one exception nothing dangerous is expected from any of them. Pennsylvania still is on the warpath and is discussing a bill which is exceedingly drastic in its provisions, but it is believed the motoring influence is strong enough in the Keystone state to stop the rampages of those solons who think it good sport to go gunning for the man who owns the car.

EVIDENCE is at hand on all sides that there has been a change of heart among law-makers who formerly were against anything of a motoring flavor. Wild laws were enacted that made life a burden for the use of cars, and it used to be that the motoring fraternity feared the sessions of the various legislatures. Now, however, it seems to be a far different proposition. In a majority of cases members of the legislature now are owners of cars themselves, and look at the matter in a different light than they used to. They realize that the motor car is not so black as it has been painted; that the drivers of them are human beings just the same as they are; that 20 miles an hour is not a dangerous pace; and that because of the excellent brakes that now are fitted a car going at even 30 miles an hour is under better control than a horse-drawn vehicle that is traveling at the rate of 10 miles an hour.

LEGISLATION in the past 6 months has been along the revenue-raising line. The legislators have had it borne in on them that it is an easy matter to collect tribute from the man who owns a car, and the various bills that were introduced at recent sessions in various states have been aimed at the pocketbook of the car-user. In most cases the road proposition has been the excuse to raise the fees and taxes. In a way this has been sort of a salve to motorists, who realize that without good roads there isn't much enjoyment in driving a car in the open country. Therefore, they are willing to do their share in maintaining the thoroughfares, and probably half the support the good roads movement has in this country comes from the motoring fraternity. The only fly in the ointment is that in some cases these funds collected from car users are misapplied. If those who are taxed could always be sure that their money was spent in the right direction there would be far less objection to existing legal conditions than there now is.

IT is noticeable that the recent sessions of legislatures have worked along the horsepower rating line. In fact, most of the bills passed have had increased taxation as their main theme. Most states have switched from the annual flat fee to a horsepower rating evidently in order to get more money out of the motorists. This wouldn't be so bad if the rates were uniform throughout the country, but they are not. Where one state tries to be just in drawing up a schedule, two will put them so high as to make owners cry out against the injustice of such exorbitant fees. Illinois has just enacted a new law which switches that state from an annual registration fee of \$2 to one that calls for horsepower rating. In justice to Illinois, however, it must be admitted that its law-makers have taken a sane view of the situation and have not tried to reach affluence by the get-rich-quick route. In time, undoubtedly, there will be some attempt made to get the various states to agree to a uniform scale throughout the country.

Business In the Fatherland Last Year

BERLIN, May 10—Germany's motor business in 1910, according to official records, was 45.6 per cent greater in total value as compared with the records established in 1909. In other words, while the total value of the export and import business in motor cars, motor cycles, parts and accessories amounted to \$10,301,000 in 1909, it totaled \$15,013,750 last year.

If one compares the figures for the export trade alone the magnitude and really surprising increase in the German export business is even more striking. In 1908 this German export business totaled \$4,685,000. A year later the amount was \$7,657,000 and in 1910 the total value of the exports was \$12,244,000, which means an increase of \$7,559,000 worth in only 3 years.

Comparing the export business with the imports of motor cars, motor cycles and parts and accessories, it is shown that the import business practically is at a standstill and that it is by no means worrying the homemakers. In 1908 the foreign-made products imported into Germany represented a value of \$2,882,750, while in 1909 the imports decreased to \$2,644,000. Last year they again took a jump, the value given being \$2,769,750.

Growth of Export Business

The difference in favor of the export business of Germany is striking. In 1908 the export trade was \$1,792,250 greater in value than the import business. In 1909 the German exports showed an increase of \$5,013,000 in cars, motor cycles and parts than the imports. In 1910 the increase of the export business over the import business showed the remarkable difference of \$9,474,250 in favor of the home business.

In going through the statistics it is shown that last year the Germans exported 3,398 passenger motor cars, as against 1,838 in 1909 and 1,151 in 1908. The average value of the exported car was \$2,290 in 1908, \$2,323 in 1909, and \$2,142 in 1910.

The number of industrial vehicles exported was 225 last year, as against 156 in 1909 and 141 in 1908. The average value of each of these cars was \$2,928 last year, \$2,591 in 1909 and \$3,280 in 1908.

The exportation of parts and accessories which in value totaled \$1,347,500 in 1908 increased to \$2,631,750 in 1909 and to \$3,837,000 in 1910. A separate account is kept of car bodies since 1909. In that year seventy-four bodies of an average value of \$400 were exported, while last year only sixty-seven were exported, but their value was \$1,000 each.

Business In Industrial Vehicles

In 1908 only forty-six industrial vehicles were imported, having an average value of \$2,353. In 1909 the number in-

creased to fifty-nine, the average price being \$2,529. Last year sixty-seven vehicles were imported and the average price of each was \$3,026.

The importation of motor car parts has been steadily decreasing. In 1908 this item represented \$209,500 in the accounts; in 1909 the amount went down to \$177,250 and last year only \$142,750 worth was brought into Germany. As for the motor car bodies imported, they numbered nineteen in 1909 and twenty-three last year, when the average body's price was \$304, or \$236 less than in 1909.

The records at hand do not show either the number of cars or their value with reference to the countries where they are shipped to or from which they are imported. Only the total weight is given and while it gives an idea of the extent of the trade with the various countries, yet it is far from providing an accurate means inasmuch as there may be instances of only a few cars representing a greater value than a whole lot of low-priced machines.



June 1—Speed trials, Bucarest, Roumania.
June 3—Floral parade of Chicago Automobile Trade Association.

June 4—Hill-climb, Trieste, Australia.

June 8—Algonquin hill-climb, Chicago Motor Club, National circuit.

June 10-11—Track meet, Chicago, Homer George, promoter.

June 10—Reliability run for electrics of Quaker City Motor Club, Philadelphia.

June 10—Track race, Philadelphia Auto Trade Association.

June 13-14—Milwaukee track races, state fair grounds, National circuit.

June 15-16—Interclub reliability match, Chicago Automobile Club-Chicago Athletic Association.

June 17—Portland hill-climb, Maine Auto Association.

June 17—Ossining hill-climb, Upper Westchester Auto Club.

June 18—Voiturette and light-car road races, France.

June 21-29—Glidden tour from Washington, D. C., to Ottawa Canada.

June 19—Reliability run of Hyperion Field and Motor Club, Des Moines, Ia.

June 20—Reliability run of St. Louis Auto Club.

June 24—Brighton Beach races, New York, National circuit.

June 24—Hill-climb of Quaker City Motor Club, Philadelphia.

June 25—Grand prix of Automobile Club of France.

June 25—Endurance contest, Denmark.

June —Hill-climb, Norristown Auto Club, Norristown, Pa.

June —Reliability run of Denver Motor Club.

June —Reliability run of Oklahoma Auto Association.

July —Track race, Panhandle Auto Fair Association, Amarillo, Tex.

July 1—Road race, Riverhead, L. I., National circuit.

July 1-3—Reliability run of Motor Contest Association through Catskills.

July 4—Hill-climb, Port Jefferson, L. I., National circuit.

July 4—Road race, Kern County Merchants' Association, Bakersfield, Cal.

July 4—Track race of Wolverine Auto Club, Detroit.

The importation of pleasure cars from the United States in 1910 has been on the increase, totaling \$12,000 pounds, as against 204,000 pounds in 1909. Like last year, France is leading in the list of foreign cars imported into Germany, with 5,300,000 pounds to its credit, as against 5,772,000 in 1909. Belgium is second, having increased its business which last year showed up a total of 2,694,000 pounds, against 2,276,000 in 1909. Then comes Austria-Hungary, Italy, Switzerland, Great Britain and the United States.

On the export tables the United States has gone down from the fifth position it held in 1909 to tenth place. In 1909 there were shipped to the U. S. A. 1,402,000 pounds of passenger cars, while last year the total is shown to have been only 1,185,000 pounds. Russia is the leading customer of Germany, and that by a great margin, having bought 7,211,000 pounds as compared with 3,156,000 in 1909. Austria-Hungary, which was the leader in 1909, is in second place last year, having purchased 5,748,000 pounds, or 1,700,000 pounds more. Great Britain is third on the list with 4,368,000 pounds, then comes France, then Holland, followed by Belgium, which trebled its German imports. Brazil comes next, having bought 1,681,000 pounds of pleasure vehicles as against only 185,000 pounds in 1909. Denmark follows, and then comes Argentine Republic, which bought nearly four times as much as in 1909. The United States is next.

As far as the commercial vehicles are concerned, practically all the vehicles imported came from Switzerland; only a few from France. Those exported went principally to Brazil, Russia, Austria, Great Britain and Italy.

Uncle Sam a Leader

When it comes to motor car parts, the United States is the leader, both as importer and exporter. Last year, it is shown, 343,000 pounds of parts came from the United States as compared with 86,000 pounds in 1909. The French imports amounted to 209,000 pounds, whereas in 1909 they were of 319,000 pounds. To the United States there were shipped in 1910 6,253,000 pounds of parts and accessories as compared with 5,788,000 pounds in 1909. France is second on the list, then comes Great Britain, followed by Belgium, Italy, Switzerland and Austria.

For the first 2 months of 1911 the trend of the export business of Germany shows further splendid increase, and if the present conditions keep up there will be from 30 to 40 per cent minimum increase in the export trade. Thus far, the increase of business has been largest with Russia, Argentine Republic, Brazil, Dutch Indies, Mexico, Belgium, Denmark, Holland and Switzerland.



Moline and Grout Win Under Formula in Chicago Fuel Test

CHICAGO, May 26—Fuel economy tests are rare in these modern days of motoring, so the annual event of the Chicago Motor Club, which was held yesterday, stands out on the calendar as something out of the ordinary. It was a most successful affair, attracting twenty-three starters, of which number all but one finished. The run went to Milwaukee and back, a distance of 192 miles officially, but really several miles more, because of the pilot getting off the route a couple of times. The roads out in the country were none too good.

Brush Wins Gregory Cup

So far as straight consumption is concerned, three of the cars did better than 30 miles to the gallon, and the winner of the Charles E. Gregory cup, a single-cylinder Brush, landed the trophy with a rating of 35.2 miles to the gallon, the cup being hung up for the car making the journey on the least quantity of gasoline. This was put up for any car, regardless of class, and provoked a pretty contest among the Brush, Hupmobile and Ford, there being only 33 ounces difference between first and third. The Hupmobile's mark was 33.9 miles to the gallon, and the Van Sicklen Ford registered 33.6.

The entire contest, however, was built around the formula class, the handicap event, which heretofore has been the only one carded. This year the club tried something new in the way of a development class, which was put on in order that manufacturers of carbureters might get a chance to make official tests of their devices. An eleventh-hour decision was to put on a free-for-all nonstock class, in which only straight consumption figured. This proved handy in that it let in several cars which could not get in the formula division because of not having been registered the requisite number of days with the A. A. A.

Moline and Grout Formula Winners

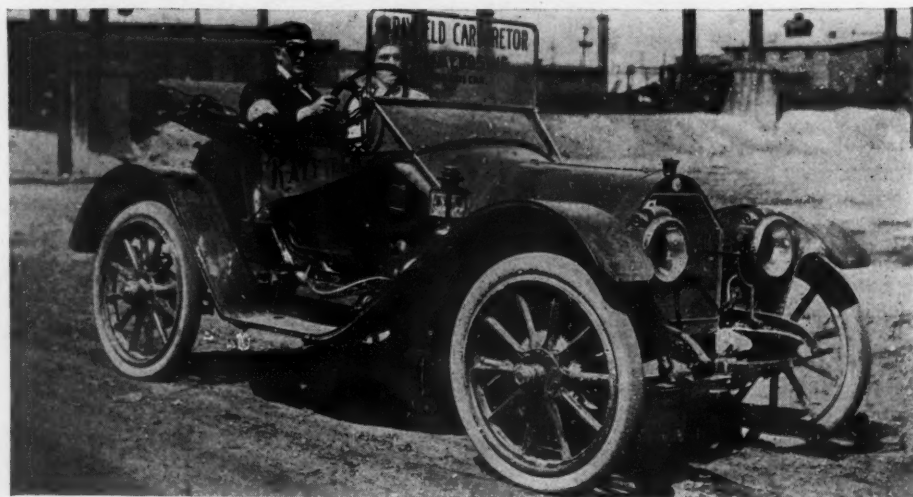
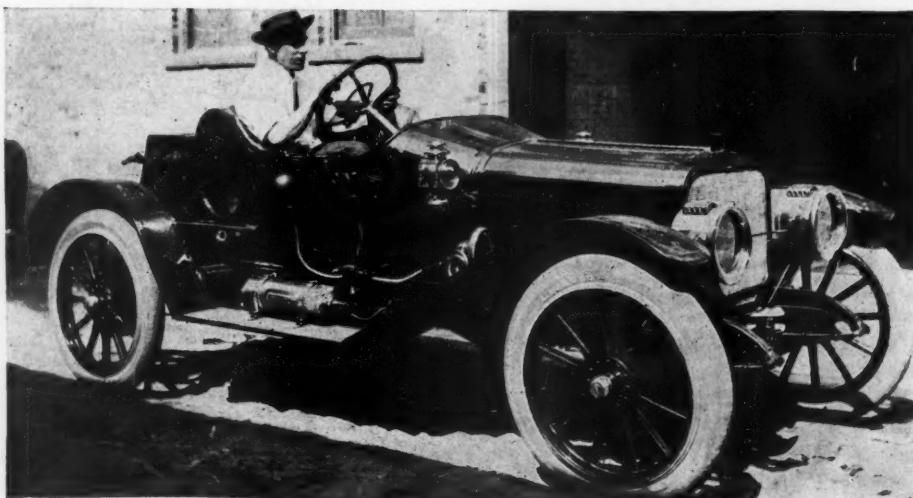
As results turned out, the formula division winners were the Moline in the tour-

STOCK CAR, CLASS 1, TOURING CARS, FORMULA DIVISION

No.	Car	Driver	Fuel in ounces	Weight	Per cent	Miles per gal.
7	Moline	Boone	1,272	3,600	2.82	19.3
9	Cunningham	Emery	1,920	5,390	2.80	12.8
8	Staver	Knudsen	1,466	3,690	2.51	16.6
6	Halladay	Johnson	1,836	3,980	2.16	13.4

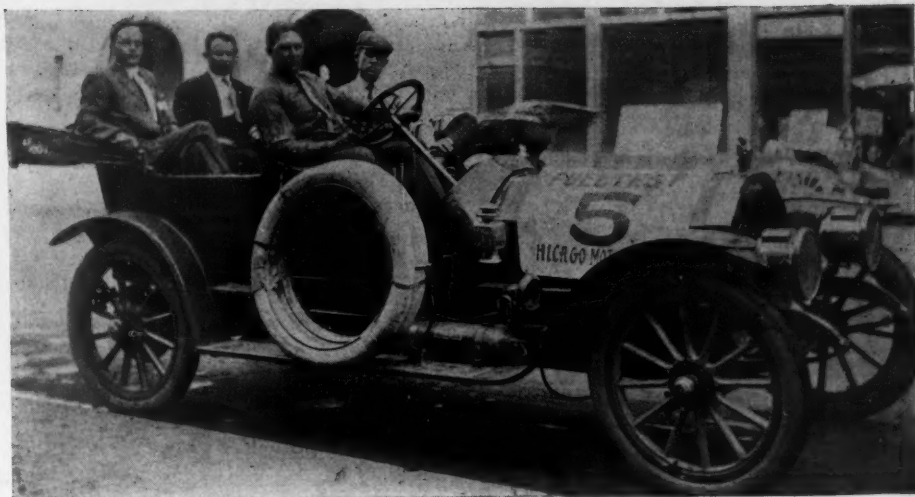
STOCK CARS, CLASS 2, ROADSTERS, FORMULA DIVISION

No.	Car	Driver	Fuel in ounces	Weight	Per cent	Miles per gal.
5	Grout	Halbert	1,327	4,030	3.003	18.5
1	Moline	Salisbury	1,280	3,500	2.73	19.2
4	Midland	Pope	1,523	3,650	2.39	16.1
3	Falcar	Pearce	1,752	3,950	2.25	14.0
2	Warren-Detroit	Morehart	1,558	3,030	1.94	15.8



TOP—MOLINE, FORMULA CLASS
MIDDLE—CORBIN, DEVELOPMENT
BOTTOM—KEROSENE CHALMERS

Brush Runabout Captures Gregory Cup on Mileage Consumption Basis

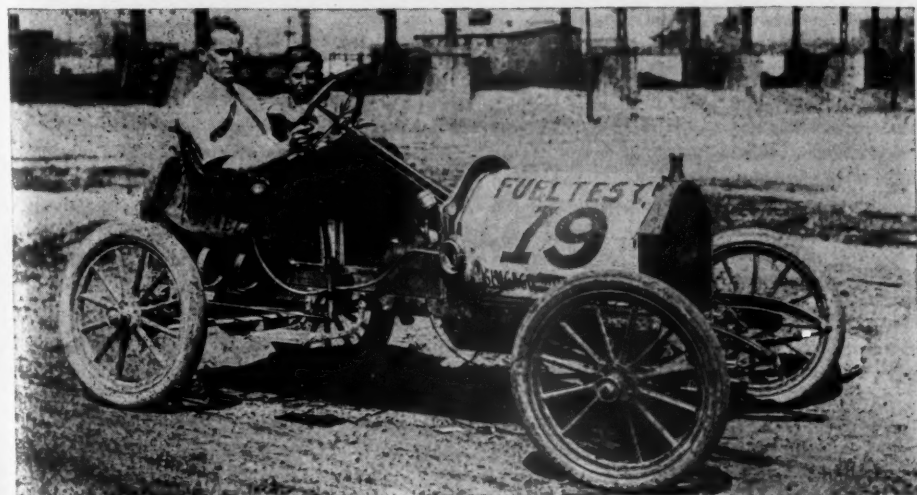


DEVELOPMENT CLASS, NONSTOCK

No.	Car	Carbureter	Driver	Fuel consumption	Weight	Miles per gal.
14	Corbin	Vortex	Bird	7 gal.	3,310	27.4
11	Overland	Toledo-Petre	Bartholomew	9 gal. 6 3/4 oz.	3,540	21.2
15	Rambler	Rayfield	Garner	12 gal. 54 oz.	4,760	15.4
10	Oldsmobile	Barry Iver	Percival	12 gal. 86 oz.	4,470	15.2
12	Chalmers	Rayfield (kerosene)	Rayfield	13 gal.	3,670	14.8

FREE-FOR-ALL, NONSTOCK

No.	Car	Driver	Fuel consumption	Miles per gal.
21	Brush	Taylor	5 gal. 59 oz.	35.2
19	Hupmobile	Findelsen	5 gal. 84 3/4 oz.	33.9
16	Ford	Van Sicklen	5 gal. 92 oz.	33.6
17	Ford	Hay	7 gal. 32 oz.	26.5
22	Cameron	Gordon	7 gal. 64 oz.	25.6
23	Buick	Hall	13 gal. 56 oz.	14.3
18	*Ford	Lanahan	13 gal. 101 1/2 oz.	13.9
—	Paige-Detroit (disqualified; 18 minutes late)		8 gal. 28 oz.	



ing car class and the Grout in the roadster division. The results were reached by means of the formula which divides the weight of the car with passenger load by the quantity of gasoline consumed as expressed in half ounces. Nine of the twenty-three cars ran in this division. In the touring car class the Moline had hard work beating the big Cunningham, winner of the fuel economy trophy in the 1,000-mile reliability last fall, which weighed 5,390 pounds and which was beaten only .02 in the percentage column. The Moline averaged 19.3 miles to the gallon and the Cunningham 12.8. The latter showed consistency in that this rating was just about what it did in the 1,000-mile run. The second Moline, running in the roadster class, turned in a card which showed 19.2 miles to the gallon, just .1 less than its larger mate.

The Grout did remarkably well in the roadster class. Carrying a weight of 4,030 pounds, it averaged 18.5 miles to the gallon and had quite a margin over the Moline in the percentage column.

Demonstration Class a Novelty

The demonstration class proved one of the features of the contest and undoubtedly will be retained in the future. It proved a boon, indeed, for those carbureter manufacturers whose devices are not stock on certain cars and who desire to ascertain officially just what kind of a showing they can make. This let in four makes of carbureters, the Vortex, Rayfield, Barry Iver and Toledo-Petre. No prizes were given in this, and there was no attempt to evolve any winners. Each contestant in this division will be given a certificate of performance.

The results were interesting, though. A Corbin roadster scaling 3,310 pounds and fitted with a Vortex vaporizer turned in a card which shows it ran the 192 miles at an average of 27.4 miles to the gallon. It is claimed by the owner of the Corbin, John F. Palmer, that in a boulevard trial he got 44.7 miles to the gallon. The

TOP—GROUT, FORMULA CLASS

MIDDLE—BRUSH, FREE-FOR-ALL

BOTTOM—HUPMOBILE, FREE-FOR-ALL

Findeisen & Kropf Mfg. Co., of Chicago, maker of the Rayfield carbureter, had two entries in this class and another in the free-for-all. It turned a trump by sending out a Chalmers roadster which used kerosene as a fuel. That it averaged 14.8 miles to the gallon on this fluid is considered not only a fine showing by those who believe that big mileage results cannot be obtained from this fuel, while at the same time it showed the great flexibility of the carbureter. Its other entry was a big Rambler weighing 4,760 pounds, which did well with a rating of 15.2 miles to the gallon. The third Rayfielded car was the little Hupmobile in the free-for-all class, which ran the single-cylinder Brush practically to a neck at the wire and which showed 33.9 miles to the gallon.

Testing Out Carbureter

The other two entries in this division were the Barry Iver and the Toledo-Petre carbureters, the former being fitted to an Oldsmobile which turned in a card showing 15.2 miles to the gallon. The Toledo-Petre was on an Overland which weighed 3,540 pounds and which made the almost double century at 21.2 miles to the gallon.

It is interesting to note that the Brush was fitted with a Kingston carbureter of the type that is stock with the Brush

company. The Grout, winner of the roadster class in the formula division, carried a Stromberg, and the Moline touring car had on a Schebler.

The trip to Milwaukee and back was rather uneventful. The roads were in poor shape out in the country, and at Kenosha the contestants were slowed by the police, who objected to anything faster than 10 miles an hour. Considerable tire trouble was experienced, the Brush being one of the greatest sufferers. Lanahan in the No. 18 Ford developed a leaky gasoline tank coming back from Milwaukee, which was his excuse for using nearly 14 gallons of gasoline.

Standard Oil Entries Scratched

It had been expected that the Standard Oil Co. would take part in this test, entering three cars which were to burn different grades of gasoline. It had been decided to try 58, 63 and 68, with the idea of demonstrating that the 58 is as good for general use as the higher grades. There came a hitch at the last moment, however, the Standard Oil Co. being unable to get the use of the three cars it had selected for the test in time to tune them up properly, so it was decided to wait until later before trying out the idea of comparative fuels.

dustries will assemble at the Algonquin hotel, and occupy the rest of the week in sessions devoted to business, professional discussion and recreation.

At the Dayton meeting papers will be presented on the following subjects: "The Question of Long- versus Short-Stroke Motors," by Justus B. Entz; "Long Addendum Gears," by E. W. Weaver; "Elements of Ball and Roller Bearing Design," by Arnold C. Koenig; "Worm Gears and Wheels," by E. R. Whitney; "Rotary Valve Gasoline Motors," by C. E. Mead; "Overside Standards for Pistons and Rings," by James N. Heald; "Some Points on the Design of Aluminum Castings," by H. W. Gillett.

During the afternoons the members and guests attending the meeting will witness aeroplane flights at the Wright Brothers' grounds, ball games and band concerts, and visit and inspect about twenty of the largest manufacturing companies in Dayton, most of whom make commodities of interest to motor car engineers. On one evening the S. A. E. members will attend a theatrical performance in a body. Another evening will be devoted to discussing subjects relating to commercial motor vehicles.

FRANKLIN WINS OLD CASE

Syracuse, N. Y., May 29—An action which, if decided adversely to the H. H. Franklin Mfg. Co., would probably have marked the end of that company's manufacture of air-cooled Franklin cars, has just been decided in favor of the Franklin company. The decision was given by the court of appeals of the state of New York and affirmed the appellate division's decision in favor of the Franklin company, H. H. Franklin, and others.

The action was brought by the New York Automobile Co. to restrain the Franklin company from making use of the ideas and designs of John Wilkinson, who is the designer of the Franklin air-cooled motor. The case had its beginning in Syracuse a decade ago. At that time John Wilkinson entered into a partnership with Frederick D. White, E. I. White and Arthur R. Peek to develop a motor car. This was in 1899. In 1900 the partnership was incorporated as the New York Automobile Co. Among the directors were John Wilkinson and Alexander T. Brown.

After the second model was turned out for the New York Automobile Co., Mr. Wilkinson resigned, claiming the company had not paid him his salary for several months. Later he sued for and recovered his salary. Mr. Franklin saw the value of Mr. Wilkinson's ideas and, with Mr. Brown, formed a partnership in 1901 as Brown & Franklin and engaged Mr. Wilkinson to develop a car. In November, 1901, Brown & Franklin transferred the motor car business to the H. H. Franklin Mfg. Co., which was making die castings.

In November, 1904, the New York Automobile Co. brought an action to restrain the Franklin company from manufactur-

French Helping Tourists

PARIS, May 15—A few months ago the French government decided to create a national touring office to be attached to the ministry of public works and under the control of the minister of this department. The office now has been organized and has made the first official announcement of the work it intends to undertake in the interests of touring. It is made clear that the new government department has no intention of encroaching upon the Touring Club of France, the Automobile Club of France, and other private associations intended to encourage touring. It is desired that these bodies shall continue to deal directly with the tourist, carrying out the same program as in the past, while the national office will occupy itself with general schemes for the development of traveling in all its forms.

The objection has often been made by the existing motor clubs and touring associations that there is no central governing body to which they can appeal for the carrying out of reforms. At present they have to bring their proposals before the different government departments, endeavor to bring the heads of the different departments together, and generally undertake diplomatic work far beyond their scope. With the touring office they will have direct access to the government, with, it is hoped, a possibility of carrying out reforms very much more rapidly than at present. An instance of the possibilities of the touring office is to be

found in the proposed international triptyque which the Touring Club has been powerless to put into execution because the matter concerned several government departments and eight or nine nations. It is desired to adopt a single triptyque for the whole of Europe, with a deposit equal to the highest amount demanded by any European government. Thus, when touring in Europe, the motorist would be able to take out an international triptyque in place of a national triptyque for each of the countries he intended to visit. The amount would be returned to him on definite proof being given that his car had been returned to the country of its origin.

The scheme is most simple, and while being of tremendous value to the motorist would considerably simplify formalities at the customs stations. But because it is an international question and one involving several government departments in each country, its execution is difficult. It is just such schemes as this that the French national touring office will take up and endeavor to bring it to fruition.

CARD FOR ENGINEERS' MEETING

New York, May 29—The eyes of the engineering world are upon Dayton, Ohio, where the Society of Automobile Engineers will hold its annual summer meeting the middle of next month. On Thursday morning, June 15, about 500 engineers engaged in the motor car and kindred in-

ing air-cooled, four-cylinder cars, and also from using any of the inventions, designs or ideas of John Wilkinson. The action also asked for \$50,000 damages.

The plaintiff claimed that Brown & Wilkinson, acting for and with Mr. Franklin and the Franklin company, had violated their duties as directors of the first company in taking and using Mr. Wilkinson's development of a four-cylinder, air-cooled motor car engine. The defense was that the defendants took nothing that was secret or patented or that was not open to everybody, that plaintiff's development had no value and that the development which made the Franklin car valuable came after Mr. Wilkinson left plaintiff's employment and during his employment by Brown & Franklin and by the Franklin company.

The case was first tried in a special term of supreme court before Justice Andrews, who decided for the defendants. July 6, 1909, the decision of the trial court was affirmed by the appellate division. April 27 of this year the case was argued in the court of appeals, and the decision of the appellate division affirmed.

WORKING ON MT. HOOD ROAD

Portland, Ore., May 26—The work of repairing and opening up the Mt. Hood road the entire distance between Sandy and the base of the famous mountain, which has been conducted in the past under the sole direction of E. Henry Wemme, will be pushed to completion this year with the assistance of the Portland Automobile Club. The directors of the club in formulating plans for the year have decided to direct attention and energies to the highway leading to Mount Hood, with the object of making it the finest motor highway in America.

The club will employ a road expert, who is to work in conjunction with Mr. Wemme in carrying on the road improvements. All the bad stretches and steep grades are to be improved. Approximately \$20,000 has been expended through the efforts of Mr. Wemme in improvements.

WAR STOPS RUBBER PLANTS

Saltillo, Mexico, May 27—The guayule rubber industry has been brought to a state of almost complete inactivity on account of the revolutionary disturbances that recently spread over practically all of the producing and manufacturing area of the suburb.

It is announced that all of the rubber factories of the Maderos, having a total capacity of 360 tons of crude rubber per month, are now closed and that all but one or two of the factories of the Intercontinental Rubber Co. have also ceased operations. The 200-ton factory of this company in Torreón no longer is running. It was forced to cease operations on account of the tying up of the railroads leading into Torreón. The guayule shrub cannot be shipped in, and the crude rubber product cannot be shipped out.

The Maderos own five rubber factories. The one at Parras has a capacity of 140 tons per month; at San Tiburcio, 100 tons per month; at Cuatro Ciénegas, 30 tons; at Las Delicias, 20 tons, and at Torreón 70 tons.

The present market price of crude guayule rubber at the factory in Mexico is 82 cents gold per pound, or \$1,640 per ton. At that price the total output of the Madero factories, if they were running, would have a value of \$590,400 per month. This is a pretty heavy loss for the family to sustain through the revolutionary operations. Besides the great wealth which the factories are capable of bringing the Maderos, the latter own many millions of acres of land, much of which is producing large quantities of guayule shrubs. The market price of the latter is \$125 Mexican money per ton. A few months ago it was selling for \$185 Mexican money per ton.

FRENCH PICK THEIR DRIVERS

Paris, May 15—Practically all the drivers have now been selected for the French lightcar race to be run at Boulogne-sur-Mer on Sunday, June 25, and the list comprises some of the best talent to be found in Europe. Lion-Peugeot has secured the services of Rene Hanriot, for-

merly a Darraq and Benz driver, Goux, Boillot, and Zuccarelli, the Spaniard who won last year's voiturette race. The Gregoire team will be made up of De Marne, the firm's chief tester, Romano, an amateur driver, Porporato, whose chief performance was the winning of the Bologna race for Berliet in 1908, and one of the most brilliant of European drivers whose name it is not yet possible to announce. Arthur Duray, the former de Dietrich crack, has joined the Excelsior team, and for the first time in his life will drive a car manufactured in his native country, Belgium.

Louis Wagner, of Vanderbilt cup fame, is one of the Aleyon team, with Barriaux and Page, both old race drivers, as his companions. Delage has a very fine team in Bablot, a former Brasier driver, Rigal, last with Bayard-Clement, Guyot, and Thomas. The Sizaire-Naudin trio will comprise George Sizaire and Louis Naudin, with the possibility of a crack big car driver taking the third racer. The English drivers have not all been announced. It is known that Reid will have one of the Arrol-Johnstons, that Louis Coatalen, who by the bye is a Frenchman, will handle the solitary Sunbeam, and that Porter will be one of the Calthorpe drivers. The others have yet to be appointed.

Iowa Glidden a Road Tour

DES MOINES, IA., May 29—According to the plans of the pathfinders and promoters of Iowa's annual Little Glidden tour, the Hawkeye motoring classic this year will be an advertisement as well as a demonstration to the motoring public of the tremendous amount of work done on the state highways by the good roads workers and boosters. The tour, which starts June 19, will cover some of the best roads in the state, and in some places will go over some of the worst, the latter roads being chosen not only to make the tour difficult, but it is thought that by planning the route over some of the highways needing improvement that enough good roads spirit will be stirred up to make their betterment a matter of only a short time.

With forty-five cars already entered the largest field ever nominated for this event will start from Des Moines the morning of June 19, eastwards 204 miles over the famous river-to-river road to the Mississippi river, winding up at Davenport for the night control, where headquarters have been arranged for at the Kimball hotel. This route will take the tourists over the well-known dragged road, said to be the finest road in the state and ranking with the best roads in the country.

The second day of the run will be 151 miles north to Dubuque and takes the tourists over what is the most beautiful and scenic part of the tour, as well as over the worst section as far as roads are concerned, for it is well known that the roads

up and down along the Mississippi river are the worst roads in the state.

From Dubuque to Clear Lake by way of Waterloo and Mason City, a stretch of 205 miles, the tourists will have their first experience over the Hawkeye highway, the new across state road from Dubuque to Omaha. This road, recently inspected by the Dubuque motorists headed by Charles Peasely, one of the fathers of the road, is said to be in excellent condition. The night stop of the tourists will be at Clear Lake, it is announced.

A part of the new St. Paul-Kansas City road will be taken the fourth day, south from Clear Lake to Des Moines, a distance of 205 miles, and should be the easiest part of the tour, bringing the tourists home to Des Moines after a trip of 750 miles on the main roads of Iowa.

TARGA FLORIO RESULTS

Paris, May 15—This year's Targa Florio, the sixth of its series, lacked much of the brilliance which attached to the earlier events, being practically an amateurs' race with thirteen starters and three to finish the course. The race was won by Ceirano, who, in a Seat car, an Italian production, covered the 279 miles of mountainous road in 9 hours 32 minutes 22½ seconds. Second place was won by Cortese on a Lancia in 9 hours 58 minutes 20½ seconds. Third prize was secured by Soldatenkoff on a Mercedes in 10 hours 23 minutes 23 seconds.

Rigid Top-Gear Test in a Panhard

Royal Automobile Club Makers Report on Direct-Drive Run of Knight-Engined Car from London to Edinburgh and Return—Trial Includes a Hill-Climb and Speed Demonstration

LONDON, May 19—What is considered a record for top-gear or direct-drive performance ended a week ago when a 25-horsepower Panhard with a Knight motor made a top-gear run of 1,042 miles, being a trip from London to Edinburgh and return. In addition to this long road test the trials included a speed acceleration and hill-climbing tests at Brooklands. The run was conducted under the supervision of the Royal Automobile Club, which had an observer on the car from start to finish. In addition to negotiating all of the distance on top gear the car on the 15-mile speed test averaged 58 miles per hour on the Brooklands track. This speed was made with a $3\frac{1}{2}$ to 1 gear ratio, which is stock for the car and was the ratio used on the 1,042 miles of road travel. In acceleration test the car attained a speed of 30 miles per hour in a 200-yard stretch, starting from a standstill and carrying its load of four persons, which it carried throughout the entire run. In the hill-climbing test a speed of 14 miles per hour was attained on the steep Brooklands hill, the car carrying its four-passenger load, which gave it an operating weight of 3,600 pounds.

Although the official report has not been given out as yet, the gasoline consumption for the entire distance was slightly over 18 miles per hour. The car throughout the run was compelled to obey the speed ordinances of 20 miles per hour, which made the fuel consumption more than it otherwise would have been, it running at a slightly higher speed.

The 25-horsepower Panhard motor used was stock in every respect, as was the car. The motor is of the Knight type, of which the company is building a great number, practically half the factory output being this type of motor. It has a bore of 100 by 140 millimeters stroke, which is 3.93 by 5.51 inches. The car was driven throughout by Edward Savill, manager of the London Panhard agency.

The run was made without a pilot car to show the way or clear the roads of traffic. Frequently the car was compelled to come to a standstill but always was started on high gear. In the northern part of England, where there are many steep hills with gradients of 12 per cent, traffic was encountered and the real hill-climbing powers of the car tested. The greatest difficulty came on the crowded steep hill in New Castle. Just as the Panhard reached the foot of one of the steepest hills a band of Gordon highlanders started coming down, followed by a big crowd of civilians. A passenger bus was making a slow ascent of the hill and got mixed with the

pipers but fortunately there was room for the Panhard to just clear by one side of the bus. The runs made each day varied; one day it was 222 miles, another day 227, another 212, and the fourth 244. Had a higher speed than 20 miles been allowed the running time could have been greatly reduced.

RIM MAKERS SOUND ALARM

Detroit, Mich., May 29—A note of alarm was sounded here Friday by the National Rim Manufacturers' Association, which held its annual convention at the Hotel Pontchartrain. The manufacturers agreed that, at the present rate of manufacture, the visible supply of oak and hickory wood could last only two or three seasons, after which these materials would become too scarce to permit their general use by the motor car trade.

That steel rims and wire spokes will be the general rule in the future seemed to be the consensus of opinion, European conditions at present affording an illustration of what may be expected in the United States. According to the rim manufacturers, oak and hickory are very slow-growing woods, and it will take from 75 to 100 years to furnish an appreciable quantity for the resumption of manufacture. There have been but few of these trees planted of recent years and manufacturers have been forced to draw heavily on the supplies of Canada. These are now about exhausted, they say. The rim manufacturers elected the following officers for the coming season: President, F. B. Anderson, Toledo; secretary, Harry D. Hartley, Windsor, Ont.; first vice-president, F. N. Hara, Merriton, Ind.; second vice-president, James Madison, New Palestine, Ind.; third vice-president, H. J. Kimball, Zanesville, O.

FORD BREAKS PRODUCTION RECORD

Detroit, Mich., May —The Ford Motor Co. has broken all local records for rapid construction of motor cars during the month of May. More than 6,000 cars were shipped from this firm's plant during that period and, although the factory had orders for immediate delivery of 10,000 cars, the firm was so appreciative of the work of its employees that an additional holiday was declared at the works, the men quitting Saturday night not to return to work until after Memorial day.

The Ford company expects to average 250 cars a day indefinitely now, having proven that this feat is within the power of its organization. The chief difficulty has been in finding freight cars and it has been necessary several nights for the traf-

fic and shipping departments to remain on duty until almost daylight, loading cars.

All the factories report big business in prospect for the 1912 models. During the last 6 weeks the Packard reports the receipt of orders for 735 cars, as against 584 for the corresponding period of last year. A night force is at work here, as well as at several of the other Detroit plants. The E-M-F company is producing about eighty-five thirties daily, this being a high mark for production at this plant. The plant 3, where the Flanders 20 is being made, is now producing in the neighborhood of fifty cars daily.

The Brush Runabout Co. has inaugurated an innovation designed to make the noon hour of its employees interesting. It has equipped several tennis courts and croquet grounds and has arranged a system of team competitions for the men and women who comprise the big office force. This is in line with the formation of social clubs at the various factories. Nearly every large plant has some sort of organization of this kind, holding annual balls and outings.

WOLVERINE TRAIL BLAZED

Detroit, Mich., May 29—The pathfinding car of the Wolverine Automobile Club is back in Detroit, after a trip around the circuit of the affiliation tour and Pilot Utz brings back a story of an enthusiastic welcome all along the line, particularly at Cleveland, Buffalo, and the Canadian cities through which will run the route of the event. The Automobile Club of Buffalo and the Cleveland Automobile Club promised delegations of from twenty to fifty cars each, while the Canadians seemed particularly pleased at the opportunity which the tour will give them to travel through four states of the union, without any trouble and vexatious delay at the customs.

Most of the Canadian tourists, according to the officials of the Ontario Motor League encountered in Toronto, have found the bonding proposition an effective bar to touring across the border. The tour has made arrangements for a blanket bond, covering all the cars, and is securing the necessary data on the entry blanks.

The most important work of the pathfinding car was the location of hotel and garage accommodations at the noon and night controls. This was found a simple matter, as the tour will end each day's run in a large city, London, Ont., being the smallest point, and the accommodations here being ample. In each city an official garage has been named, the owner of which will keep in touch with the committee and arrange for accommodations for the entire party at his place, supplemented by whatever co-operation he needs from other garage owners. Flat rates of reasonable character for gasoline and lubricating oil were also arranged.

Data was compiled for a complete roadbook, a feature of which is a brand new route from Detroit to Toledo. This stretch

of road has long been considered a Nemesis by the motorists of the two cities at the terminals. As originally planned, the tour was to have escaped the river road by a long detour through Adrian and Wauseon, O. The patchfinder discovered a fine road much shorter in length, by way of Ypsilanti, Ida and Milan. The discovery is deemed of such importance that the Wolverine club has appropriated a sufficient sum to place signboards along its entire length. This will be done before the start of the tour.

NATIONAL WINS AT DENVER

Denver, Colo., May 30—Special telegram—A 200-mile race was pulled off today with 15,000 people in attendance. There were no accidents except a broken axle and mechanical troubles. Eaton McMillan, driving a National, won the race in 3 hours 30 minutes 30 seconds. William Thorney, driving a Ford, was second, in 3 hours 51 minutes 40 seconds. An Oakland, driven by Jimmy McDonald, was third; Harry Ball, in an Apperson, dropped out in the seventeenth lap, on the fifty-sixth mile, on account of bearing trouble. A Warren-Detroit, driven by Mustain, quit in the twentieth lap, the sixtieth mile, on account of burned out bearings. An Everitt, Martin Fletcher driving, broke an axle in the twenty-first round or seventieth mile. A Warren-Detroit, Borsch driving, dropped out in the thirty-fifth lap. A Michigan, Jackson driver, was out on the twenty-second lap.

HALLADAY INCREASES STOCK

Streator, Ill., May 29—The Streator Motor Car Co. has increased its paid in capital stock from \$300,000 to \$500,000. With the increase there has been some change in the personnel of the officers of the company, which is now as follows: John C. Barlow, president; Paul R. Chubbuck, vice-president; A. L. Goetzman, treasurer; Robert Van Arsdale, secretary. Both Mr. Goetzmann and Mr. Van Arsdale are Chicago men—the former for several years has been secretary of the Millers' National Federation, and will take an active interest in the business. There will be no change in the working force of the organization, B. F. Anger remaining as chief engineer, Herbel Morris as sales manager, L. A. Bailey superintendent, and P. W. Seiler in charge of the service and repair department. There will be no change in policy; the present models being continued next season.

COST OF CONVICT LABOR.

Seattle, Wash., May 29—For 21,075 days of convict work at Lyle, Wash., on state road No. 8, the state made an average profit of \$3.95 for each day one convict was worked on the new Columbia river highway.

Figured on the same basis that all highway work is done for the state and a basis that is recognized by railroad engineers,

Two Big Races Awarded to Savannah

Georgians Induce Motor Cups Holding Co. to Send Grand Prix and Vanderbilt South—No Date Set But Road Carnival Likely to Be Held at Thanksgiving Time—Details of the Deal

NEW YORK, May 30—Special telegram—Following conferences among officials of the Automobile Club of America, and the Motor Cups Holding Co. and Mayor Tiedeman of Savannah and Secretary A. W. Solomon, of the Savannah Automobile Club, it practically is certain both the Vanderbilt and the grand prize road races will be run over the Georgia course.

It is settled that the grand prize will go south, but in relation to the Vanderbilt, since this event is under the control of the A. A. A. there are formalities to be concluded before it can be said with certainty that the Vanderbilt cup will be run at the same time and place. The idea that is being put forward is to hold the two events on succeeding days, the grand prix to be handled by the officials of the A. C. A. which will surrender its position during the holding of the Vanderbilt cup event, the latter to be run off under the direction of the contest board of the A. A. A.

The distinguished party of Savannah citizens, including the officials, Mayor Tiedeman and Judge Moore, having concluded negotiations with the officials of the Motor Cups Holding Co., went back to Savannah tonight with the expectation that they

will come back to New York at a date to be fixed in the near future for the purpose of conferring with the A. A. A. contest board relative to the sanction for the Vanderbilt cup race.

Savannah Hears the News

Savannah, Ga., May 30—Special telegram—When news was received in Savannah today that both the Vanderbilt and grand prize races had been gotten for this year, besides the international light-car race, it surprised every one of the 80,000 people in this city. Work on the course, which is not in good condition, will be commenced at once, and when the drivers make their appearance here in November a new circuit will be found, one that cannot be equaled in any part of the United States. Already military protection has been secured, and the grand stand is up from last year, so the only work to be done is to the course, which will be made as smooth as asphalt pavement. Several of the turns are banked, and probably others will be treated the same way, so more than 70 miles an hour can be made this year. The Savannah Automobile Club expects at least 100 entries for the different races and at least 100,000 strangers in the city for the 3-day event.

the work accomplished by the Lyle convict camp was worth \$119,110. It cost the state exactly \$36,820 to accomplish the work, a profit through the use of convict labor of \$82,290.

The convict camp at Lyle, regarded as one of the most successful in the state and at the same time one that had the most difficult piece of road work to accomplish, was established in January, 1910.

Convicts were sent to the camp to build a portion of the state road projected from Washougal in Clarke county, to Goldendale in Klickitat county. The camp was situated on a side hill above Lyle, where a splendid view of the Columbia river was possible, good sanitation provided and excellent water at hand.

The prison labor was put to work blasting a roadway around a precipitous bluff about 300 feet above the level of the Spokane, Portland and Seattle tracks. Practically all the work was of the heaviest character of rock work and extremely difficult to handle.

The construction of the road, however, meant that a maximum of 5 per cent grade would be provided up the Columbia river in contrast to an almost impassable road projected over the series of hills on the Upper Columbia.

The total cost of the camp, its operation, salaries, engineering, equipment, materials,

transportation and other expenses from the date of its establishment to March 15 of this year was \$39,815.20, as shown by a special report just made by the highway commissioner.

A disposal value of the camp, its equipment and the tools of the force is estimated to be \$2,994.95, leaving a net cost to the state of work on the Columbia river road of \$36,820.25.

The total number of days of convict work was 21,075 and the average expense to the state incident to working one convict one day was \$1.75.

An engineer's estimate of the work done up to March 15 shows:

Work—	Yardage	Rate	Total
Earth excavation.	2,606	\$ 0.30	\$ 781.80
Loose rock.....	113,175	.50	56,586.50
Solid rock.....	13,414	1.00	13,414.00
Solid rock, big fill.	20,498	.65	13,323.70
Riprap, hand plac'd	7,130	2.00	14,260.00
Masonry, 4th class	3,490	4.00	13,960.00
Masonry, 3rd class	710	8.00	5,680.00
Concrete.....	67	12.00	804.00
Clearing.....	3 acres	100.00	300.00
Total estimate..	.....	.....	\$119,110.00
Cost of camp.....	.....	.....	36,820.00

Profit to state..... \$ 82,290.00

On the basis of 21,075 days of convict work this gives an average profit to the state for each day one convict was employed of \$3.95. The daily value of each convict's work was \$5.75 but from that amount the cost of maintenance and other expenses, amounting to \$1.75 a day, is deducted.



Legal Lights and Side Lights

NEW HAMPSHIRE LEGISLATION

THE New Hampshire legislature has completed its labors and there will be no more legislation for the next 2 years, so that will give residents a chance to see how the new motor law works out. Some of the sections went into effect this month and the other sections relative to registration, etc., go into effect January 1 next. The new law is patterned after the one in Massachusetts in some respects, but there are some modifications here and there that are commendable and others that are not.

The section relating to non-residents follows that of Massachusetts in that it allows visitors only 10 days to go into that state, and it says in this regard "in estimating the number of days of use by a non-resident under the foregoing privilege, any fractional part of a day's use shall be held to be a day." The New Hampshire people do not realize just what that means if the law is literally enforced. The Connecticut river divides the state from Vermont on the west, and there are dozens of cities and towns along the river where there is daily communication by motor cars. When the Vermonters find themselves barred there will be a howl, and then it will put up the bars to New Hampshire motorists. From a business point of view the law is regarded as absurd and the probabilities are that it will not be enforced. On the easterly side is Maine, and while that state has no such radical law one might be passed by the next legislature to meet the conditions. Then with the thousands who flock to the mountains in motor cars each summer they will go elsewhere if they find themselves held up. Like in Massachusetts the hotel men were asleep when the law was passed.

The new law requires applicants for licenses to prove their qualifications especially chauffeurs, and no one under 16 can get a private license and no one under 18 a chauffeur's license. In the matter of chauffeurs New Hampshire has gone backward. Into the law has been written a section charging \$5 for each chauffeur's original license, examination and badge. The charge for a private license is \$3. In Massachusetts the badge has been eliminated because it was found worthless and no one could be found who knew why it had been put in the law.

All along the line the tendency has been to raise the prices over that of other states in registering motor cars. The commercial vehicles are rated at \$5 in Massachusetts and New Hampshire decided to double it. In the Bay State the fee for registering dealers' cars is set at \$25. New Hampshire puts the price at \$40. The fees for motor cars follow: for cars under 15

horsepower, \$10; between 15 and 30 horsepower, \$15; between 30 and 40 horsepower, \$20; between 40 and 50 horsepower, \$25; between 50 and 60 horsepower, \$30; all over 60 horsepower, \$40. In Massachusetts the fees range from \$5 to \$25. All fees and fines after paying the expense of the motor department go to highway maintenance.

The speed is taken care of in a section which says more than 25 miles on country roads; 15 miles in thickly settled sections and 10 miles where the operator's view is obstructed is regarded as being too fast. The clause regarding "reasonable and proper considering the conditions" is in the section. In the penalty sections one commendable thing is the fact that there is no minimum clause for some of the violations so the judge can place cases on file if he sees fit. Only where motorists are convicted of being reckless or drunk in driving is there a minimum and jail sentence attached.

The legislature amended the law so that motor cars are classed with other vehicles in the section of the statutes relating to people taking vehicles without authority. Another good law passed is that which orders that all covered bridges in New Hampshire shall have openings in the sides that will allow plenty of light so that people driving through them can see objects or obstructions on the highways some distance beyond the end of the bridges as well as in the bridges. There are many such bridges in the state. Laws were passed for the building of highways around Lake Winnepesaukee and Lake Sunapee and connecting them with the regular state highways now under construction. Cities and towns are given the right to exclude motor vehicles from roads that are not state highways, but they are not allowed to make any speed regulations of any sort.

CANADIAN CUSTOMS

The new regulations that the Canadian government has recently issued, covering American cars entering Canada, have been given out as follows: On entering Canada, a deposit of \$25 must be paid to custom officials, which is refunded on leaving Canada, and two Canadians must be found who will sign a bond for double the amount that would have to be paid on the car if it remained in Canada. The car may remain in Canada for a period not to exceed 6 months of any 1 year, and may go back and forward to the United States as often as the owner wishes during the year by simply reporting to the custom officials on the wharf if boat shipment is made, or at custom house if at the border towns, each time on leaving Canada.

These regulations are a great improvement over those in force in 1910 and pre-

viously, which limited the tourist to a 3-months' stay and without the privilege of going back and forth. The new regulations are very satisfactory for the American motorist who wishes to make several trips to Canada during any one season. However, if only one trip during the season is desired, the 3 days' grace that was extended the visitor last year has now been increased to 30 days, and where the responsibility of a visiting motorist is established by his connection with a motor club, the formality of the bond is done away with entirely, provided he does not wish to stay over 30 days.

All that is required in this case is a declaration of the names, description of the car and number of passengers and details as to extra equipment carried. A card will be issued which is to be surrendered to the custom officials when returning to the United States.

CONCESSION IN BOSTON

The Bay State A. A. won a notable victory last week when the Boston park commission announced that, in response to the demand following a hearing a few days ago, the regulations governing motor cars on Commonwealth avenue would be changed. On this avenue for 4 years all motor vehicles were forced to keep to the left hand side; the avenue being divided in the center by a wide grass plot; and when the fenway section was reached the continual crossing because of this rule has endangered motorists and caused a couple of bad accidents. The rule was first put into effect to protect the children playing on the avenue, and the commission did not pay any attention to requests for a change until the Bay State club forced the hearing.

The matter was thoroughly threshed out at the meeting and it was made plain to the park commissioners that a change should be made. Mayor Fitzgerald also put in a word for the motorists, and while there was opposition, it was not very strong. This resulted finally in the commission not only changing the regulation so the universal rule of the road of keep to the right has been restored, but in future all vehicles going out of town must keep to the northerly of the avenue and all incoming vehicles on the opposite side, having the effect of making each side of the avenue a one-way street. Before there were no restrictions on carriages.

EVERY LITTLE BIT HELPS

The Massachusetts senate last week overruled the vote of the committee on roads and bridges which voted against the bill compelling all vehicles to use lights at night. Senator Hibbard, chairman of the committee, was in favor of the bill all the time and when the committee reported ad-

versely on it he took the matter up in the senate. The vote to report and pass the bill was 26 to 15. This does not mean the bill will be passed, however. Representative A. E. Bliss, who is a member of the Malden, Mass., Automobile Club, tried to have the committee report overturned in the lower branch, but he was beaten, not even being given the privilege of a roll call. Now the bill goes from the senate to the house and the chances are that the house will not pass it so that it will be dead again this year. But even this is greater progress than a year ago when the bill only reached the house where it failed of passage.

HEAVY DAMAGES AWARDED

The largest verdict ever rendered in a suit for damages against motorists was given in the superior court at Dedham, Mass., last week when a total of \$33,000 was awarded. The motorists who were defendants were William H. Thayer, of Brookline, and George M. Harrigan, of Lowell. From the evidence it seems their cars were being raced in the fall of 1909, going to the south shore, and meeting a carriage the drivers turned to either side to pass when they came upon Richard E. Brown and Richard L. Cressy, two boys, on bicycles. The cars were going so fast that there was no time to stop and the Brown boy was killed while the Cressy lad was badly injured. A verdict of \$8,000 was given against both Thayer and Harrigan in favor of relatives of the Brown boy, and \$12,500 against each was rendered for the Cressy lad.

MUNICIPAL ORDINANCE HELD INVALID

A statute of the state of Texas provides for the regulation of hackmen, draymen, omnibus drivers, etc., by the various cities by virtue of municipal ordinances. Under this statute the city of Clarksville passed an ordinance prohibiting any person under 16 years of age from driving a motor car. The statute was attacked as unconstitutional, and was held invalid. The court held in substance that Clarksville had only the power to regulate, which power did not include the power of prohibition.

FEATURES OF OREGON LAW

Flooded with inquiries as to the new Oregon motor vehicle law, Secretary of State Olcott has prepared a brief statement covering the salient features of that law as they relate directly to the duties of those driving such vehicles.

"Anyone not having a state license, and desiring to operate a car between June 1, 1911, must secure a license under the old law, the fee being \$3. This certificate holds good until July 1, 1911, when it will be necessary to secure a number under the new law."

The fee under this new law is based on the horsepower of the vehicle according to the A. L. A. M. formula. Those applying after June 1, 1911, will be issued new numbers under the new law. This law is effective August 1, 1911, but application

can be made 60 days prior to that time. The new number tags are 4 inches by 13 inches, and two tags are required, one for the front and one for the rear of the vehicle.

Owing to the complications it would cause, no numbers will be reserved, but same will be filed numerically from one on and according to the date received. Chauffeurs or owners operating a car for hire are required to secure a state badge before being allowed to operate.

BREAKING UP SPEED TRAPS

The recent ruling of the Massachusetts supreme court to the effect that driving faster than the law says is not evidence enough to convict in the state courts has had the effect of breaking up the traps system in Boston. Last Thursday, the regular court day for speeding motorists, there was one motorist in court charged with speeding, and he had been summoned before the law decision was made. On other Thursdays there were anywhere from fifty to seventy-five on hand. The police commissioner has given orders to discon-

Iowa Planning Work on Its Roads

DES MOINES, IOWA, May 30—The interstate trail, the latest road to be promoted through Iowa, is to be boosted by the good roads committee of the Des Moines Commercial Club. The road as proposed will connect Kansas City with St. Paul and Minneapolis through Des Moines and Mason City, Iowa. The route for the road, and preparations for its dragging will be made by the promoters of the road in Iowa, Missouri and Minnesota, assisted by the local commercial club. The Blue Grass road, a new road across southern Iowa, is now being platted by the Iowa Publishing Co. Joe Long, secretary of the Blue Grass Road Association, and state manager for Governor B. F. Carroll, was in Des Moines this week and announced that \$100,000 would be expended this summer in improving the highway.

The Polk county division of the famous river-to-river road through Iowa is to be graded this summer and covered with a coat of shale. This section has always been counted the poorest piece in the great Iowa highway and to overcome this drawback the county board of supervisors, acting in conjunction with property owners along the road, propose to rebuild the road through Polk county. The Keystone Coal Co. will furnish cinders to cover the coating of shale through the county.

The new motor road between Des Moines and Clear Lake, the big Iowa summer resort, was marked last week with white bands. The bands, 18 inches wide, will be placed on telephone poles at every turn of the road and crossroad. In the middle of the band will be a small 4-inch band to distinguish the mark from the white band of the river-to-river road.

tinue working the traps until the law has been changed. This will not be done now until next year, if at all. In some of the other cities and towns the officials are bringing in the charge that motorists have been driving recklessly and not using due care rather than speeding. How far this will work out remains to be seen, as appeals are being taken by a number of the motorists. Some motorists felt that the decision meant they could race their cars at any speed following the court's decision, but as reckless driving, if a conviction follows, means a suspension or revocation of the license by the highway commission will bring a halt to that idea.

NEW JERSEY RELENTING

The Massachusetts highway commission has received a communication from J. B. R. Smith, motor vehicle commissioner of New Jersey, to the effect that unless New Jersey motorists are permitted touring privileges in the Bay State the 8-day touring privilege now accorded visiting motorists will not be extended to Massachusetts motorists. Under the Massachusetts law of last year New Jersey motorists are not allowed the 10-day touring privilege in the Bay State that is extended to motorists from other states. Owing to the attitude of New Jersey the Massachusetts commission last year barred motorists from that state from using the Bay State highways; the best that they could get being the 3 months' privilege, for which a charge is made. The Massachusetts highway commission feels that the 8-day privilege allowed in New Jersey for which a fee is charged is not real reciprocity within the meaning of the Bay State law which says non-residents may tour Massachusetts 10 days provided their states grant like exemption to Bay State motorists. Of course that is easily understood, the New Jersey law being anything but reciprocal. It seems that many New Jersey motorists have been prodding Commissioner Smith and he is trying to make some arrangements with the officials in neighboring states, but without much result due to the narrowness of the New Jersey legislators.

AIMED AT THIEVES

The Wisconsin legislature is considering a bill introduced by Senator Isaac T. Bishop, of Somers, Kenosha county, providing a penalty for tampering with motor cars. The bill is aimed particularly at persons who remove accessories while cars are standing at curbs.

CUTS OUT SPEED LIMIT

By concurring with the house the Connecticut senate enacted into law a new motor bill which has no speed limit, being similar in this respect to the old law. An effort had been made to place a limit of 35 miles to prevent New York scorches ripping up the roads between Bridgeport and New York. Non-residents will have 30 days' free privileges under the law, and the registration fee is changed to a flat rate of 50 cents a horsepower for all sizes of cars.



Routes and Touring

Motor Car

Camping Trip

An Inexpensive Vacation Made Possible by Camping From a Motor Car—What To Take

CLEVELAND, O.—Editor Motor Age—A motor car camping trip sounds formidable, perhaps. Possibly you shudder at the recollection of some unfortunate camping experience. You can safely forget it all, remembering that you didn't know how then, and let what follows readjust your ideas. Where to go—you are limited only by the quality of the roads and in no other way. You may have read descriptions of hunting and fishing trips with the motor car, they tell but half of the story and are discreetly silent about the expense feature.

The constant worry to reach good hotels at noon or night, that has marred your previous trips, is a thing of the past. Any fertile farming country will afford good camping place and the best of fare. One can travel 30 miles per day or 150—if one doesn't like a neighborhood, a day's run will change the state and scenery, the car contains everything wanted—bed, board and shelter.

In selecting your party, Stewart Edward White has given some valuable hints in *The Forest*. In any event the members must be congenial and with good dispositions. They need be neither strong nor robust—your trip isn't going to be an endurance run and no more violent than

If you must have servants, compromise on the chauffeur and let the rest go. The ideal party consists of two congenial couples, the women should know how to cook just a little and the men should understand the car, and the rest will take care of itself.

for the trip—we used a White gasoline car.

An extra casing or two, some inner tubes, tire air tanks, luggage carrier, tire trunk, tire chains, extra spark plugs and complete set of curtains. Cut slots along each running board so you can run straps through. Some plastic cement to repair



OVERNIGHT IN THE WOODS

When it comes to the car, it pays to get a good one. Tires and gasoline cost money, and if that is an object, select a light car. On the other hand, don't go to the extreme of trying to tour with a toy. The medium power, medium weight car is the right one, but it means get the very best of this kind—reliability is the

cuts in your casing will prevent trouble, and everything else will be found in your tool box already if you are a careful driver.

The equipment may be selected to suit individual requirements, but every article in the following list has been tried and tested. They will all pack on the car easily and will fill your every want.

One canoe tent, 8½ by 8½ feet.

One A tent, 8 by 10 feet. The tents should have ground cloths attached, bobbinet fronts, windows, jointed poles and steel stakes.

Four folding camp stools.

Four folding cots. Pneumatic mattresses will do just as well, but they are very expensive.

Blankets.

Ponchos.

Pneumatic pillows.

Two or three waterproof buffalo bags.

Canvas water bottle.

Folding water bucket.

Folding water basin.

Two hatchets.

Clothes line.

Aluminum cooking set. Complete set for four packs inside the largest pail.

Alcohol stove.

Two quarts wood alcohol.

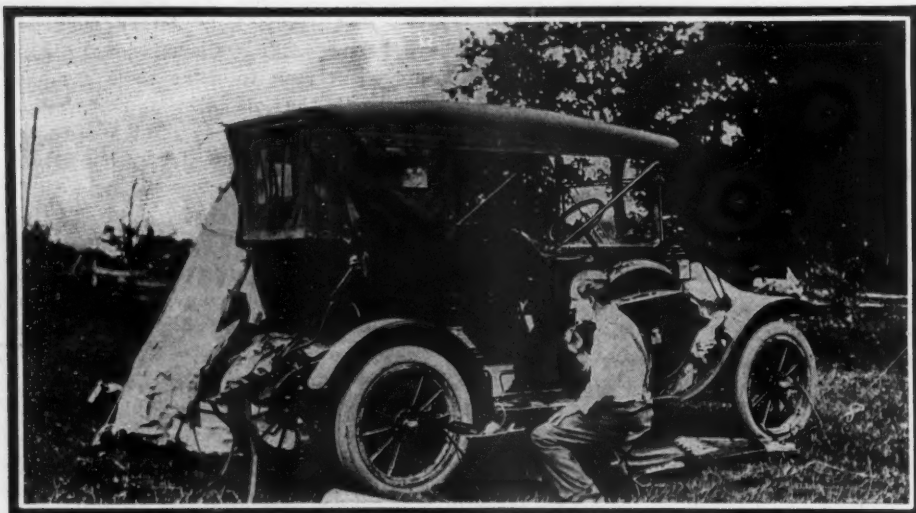
Refrigerator basket.

Two vacuum bottles in case.

Two electric flash lights.

Camera and tripod.

Fishing tackle.



THE BARBERSHOP

you make it. Hardships won't be encountered, but the little party will get an awful lot of each other's society, and this is the one element that requires careful handling that it does not develop into a serious problem.

key-note. Any five-passenger car with a wheelbase of 110 inches, or thereabouts, will carry you and all your impedimenta without a murmur. A large car isn't necessary for this purpose, and the light car will require little special preparation

Information



Large assortment of straps and several tarpaulins.

Canned goods, bacon in glass jars, condensed cream, coffee, sugar, etc.

Personal baggage should be reduced as low as possible; two double suit cases will go on the luggage carrier nicely, two large

appetites and the environment? At least, four people voted, it the best ham and eggs, bread, butter and coffee they had eaten in many a day, although it was prepared on an alcohol stove. The outfit shortly after was strapped to the machine and we were on the road. This day we

quality of the meal, we vowed it would be the last luncheon in a hotel, that our future meals would be in the open; and we kept our vow. Thence on to Springfield, along the national highway, our camp was pitched in a meadow some distance back from the road, where we were made welcome by the owner of the farm. The following day we spattered on through the mud of Dayton and Cincinnati, a heavy rain storm soaking the roads until they were a sea of mud. The climb out of the valley along Harrison avenue was a nightmare of mud, unballasted tracks and holes of unknown depth.

We then crossed into Indiana, and the fine gravel roads gave us ideal touring conditions. At Indianapolis we spent a hot, sultry night in a hotel and decided that we would not again desert our cool tents and comfortable cots. The next night we camped near a picturesque old church. At Rochester we learned of a fine lake, said to be full of fish, which was about three miles distant and where, on a clean, wooded knoll, with a spring of cold water gushing out of a mossy bank just below, we spent two nights and a day in a perfect camp.

Our next run took us through South Bend and into Michigan, where we pitched our tents on Eagle Lake, in fully as pleasant a camping spot as that of the previous night. Here also it rained hard through the night, but not a drop came through to disturb our slumbers. The following afternoon, as we were spinning along to-



A FOLDING COT FOR A TABLE

duffle bags will ride in front of them, and it is well to have a combination camp and motor tool outfit consisting of spade, hatchet and pick-axe, also a coil of strong rope. It is surprising to see how easy all of this outfit can be stowed on a car. One illustration on the next page shows the outfit just as described, in place ready for road work.

In the foregoing pages you have read how a motor camping trip should be taken; it is usually easy to give such advice, but rather hard to follow it. This is the story of how the little trip was taken—where we took our own advice.

On a threatening day in July we pulled out of Cleveland carrying with us the equipment I have described. The weight of the outfit was about 250 pounds, and none of the four passengers was a lightweight. Its load, however, did not trouble the little car in the least, and we crossed Summit and Stark counties into the beautiful Tuscarawas valley. Luncheon was eaten in a pleasant schoolhouse yard. At Massillon we took on ice for the refrigerator basket and refilled the vacuum bottles. Not far from Beach City we pitched our first tent in a fine open road, using a folding cot for a table and our four little steel camp stools for dining room chairs. We were soon enjoying a delicious supper in the cool evening air.

Next morning we were up with the sun. After a short time we were eating the best breakfast we ever ate, or was it our

followed the valley through Canal Dover, New Philadelphia, Coshocton and Dresden. The roads were good and we kept on our way with practically no slip. We lunched on the bank of the canal, and at night camped in a field of new cut clover. Eggs and milk were purchased from the farmer



THE OPEN-AIR KITCHEN

who gave us permission to sleep in his field, and we passed another very comfortable night.

The next day we sped through Zanesville and Newark, eating our noonday meal at a Columbus hotel. Regardless of the

ward Ann Arbor, a violent thunderstorm came out of the west and struck us almost without warning. We quickly applied the curtains to the machine, ran into the nearest meadow and managed to get the tents up and well staked to the ground just as

the storm burst. Supper was cooked in the A tent and eaten by lantern light.

Our next three camps were in Canada. The first, close to the shore of the Detroit river where we bought a supper of frog's legs, fish and chicken. The next camp was in a shady schoolhouse yard some fifteen miles from London, and the last night under canvas was spent on a bluff overlooking Lake Ontario. It was the twelfth camp—not one of which could be considered uncomfortable or unpleasant in any way. Everywhere we asked we were cheerfully given permission to camp, and we did not have a disagreeable experience on the whole trip.

One puncture was the sum total of our tire trouble. Lucky, you say? Not altogether; we took care of our tires, using an air gauge, and stopped up every little cut in the casings with plastic cement. The odometer registered nearly 1,200 miles at the finish, and we had averaged a little better than seventeen miles per gallon of gasoline consumed.

If you will but follow our example and not forget the refrigerator basket, it will enable you to serve canteloupe a la mode at noon or night; it will keep your butter

and fruit cold, and be useful in scores of ways. You need only keep your eyes open for picturesque spots for noon-day stops. For example, here is one of them: on the north shore of Lake Erie, where we had a fine swim as well as a delightful luncheon in pleasant surroundings. Above all things, enter into the spirit of the game; make friends wherever you go; do your full share of the work and do not undertake to cover too much distance every day.

Perhaps the most surprising feature of all will be the low expenses. You will find it difficult to spend money. For example, it cost us but \$1 to \$1.25 per day to keep the car going and our meals rarely cost us \$2.50 per day for the crowd. When you consider that there were no transportation nor lodging bills to pay, it begins to dawn on one that this is just about the cheapest vacation to be devised.—A. N. V.

FORT WAYNE TO Ironton

Auburn, Ind.—Editor Motor Age—Will Motor Age, through the Routes and Touring Information department, publish a good route from Fort Wayne, Ind., to Ironton, O., by way of Warren county, Ohio? What kind of roads are in the southern part of

Ohio and are they very hilly?—Forrest W. Kessler.

Traveling from Fort Wayne, Ind., towards Warren county, Ohio, takes the tourist through Lima by way of New Haven, Van Wert, Delphos and Elide; thence due south to Dayton, via Cridersville, Wapakoneta, Botkins, Anna, Sidney, Piqua, Troy, Vandalia, and Chambersburg. Passing on to Centerville and Ridgeville you reach Lebanon, which is about the center of Warren county. So far the road leads over level country on good gravel or stone roads practically all the way.

From Lebanon the next town is Morrow, and Motor Age is advised by a tourist familiar with that part of the country to route you to Washington Courthouse and Chillicothe, through Clarksville, Wilmington, Reesville, Sabina, Washington Courthouse, Frankford and Chillicothe.

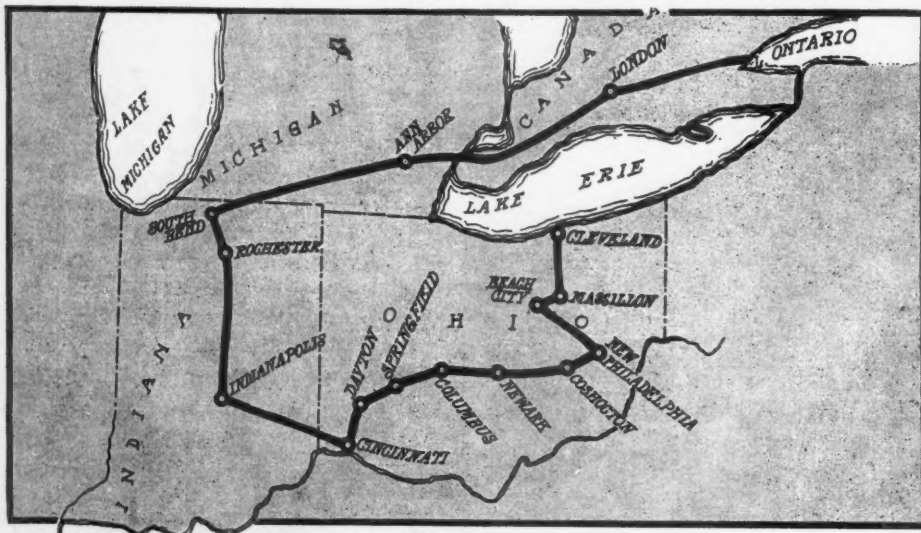
Motor Age has no information on the itinerary from Morrow to Hillsboro, but if you can possibly find a satisfactory road from some one in Lebanon or Morrow, continue on through New Boston, Rainsboro, Bainbridge, Bourneville, and Chillicothe. This leg of the route follows the Paint river very closely and is a most picturesque one. Motor Age would suggest that you visit Paint creek, where it passes through a deep gorge, about 13 miles east of Hillsboro, if you take in that town.

Chillicothe to Ironton, a distance of 90 miles, is over the Waverly pike, through Waverly, Piketon, Lucasville, Portsmouth, New Boston, Hanging Rock, and then on the road leading through a covered bridge over the creek and straight into Ironton.

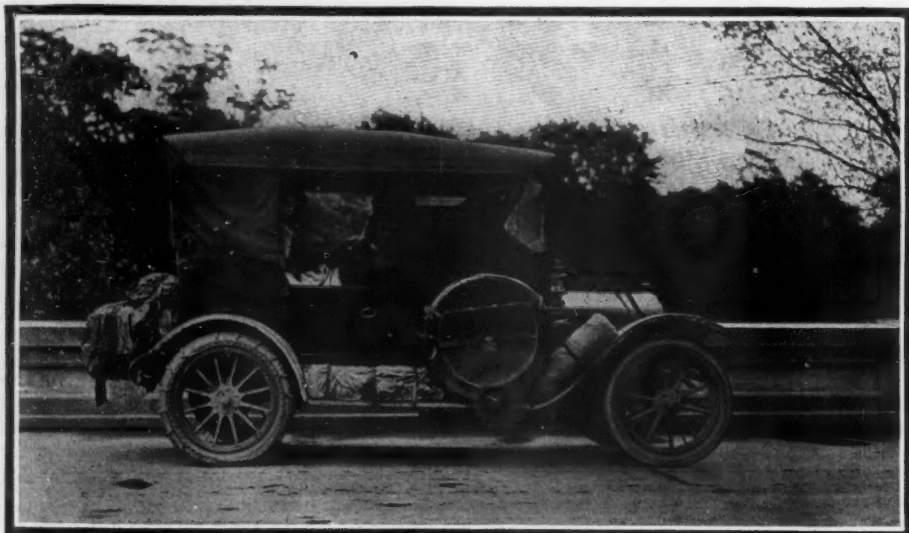
CHICAGO TO ST. LOUIS

Chicago—Editor Motor Age—I live at Fort Worth, Tex., and am planning a trip home in my car the middle of June. I have decided to follow the route to St. Louis as suggested in Motor Age, issue May 5; that is, from Chicago to Bloomington, Springfield and St. Louis. I am undecided as to the route from St. Louis to Fort Worth. Would Motor Age advise crossing over to Kansas City and then going south? Kindly advise me as to the best route. Also what would be the approximate mileage from here to Fort Worth? Any other information or advice will be greatly appreciated.—Sidney M. Harrison.

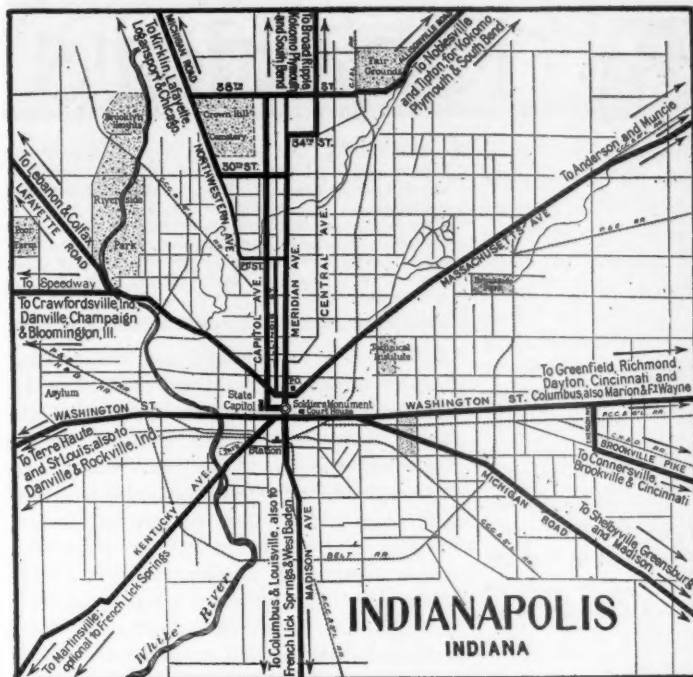
As you have decided to go to St. Louis, Motor Age suggests, then, that you follow the route shown by the dotted lines in the map on page 24, issue April 6 of Motor Age: a town-to-town itinerary being given in the Cincinnati-Denver route on the same page. From Kansas City go to Oklahoma City following the Glidden tour route of 1910 through Shawnee, Pleasant View, Olathe, Gardner, Wellsville, Ottawa, Williamsburg, Waverly, Lebo, Emporia, Cottonwood Falls, Florence, Elbing, Newton, Wichita, Wellington, South Haven, Renfrow, Medford, Enid, Orlando, Guthrie, Britton, Oklahoma City. From this point to Fort Worth you will find the



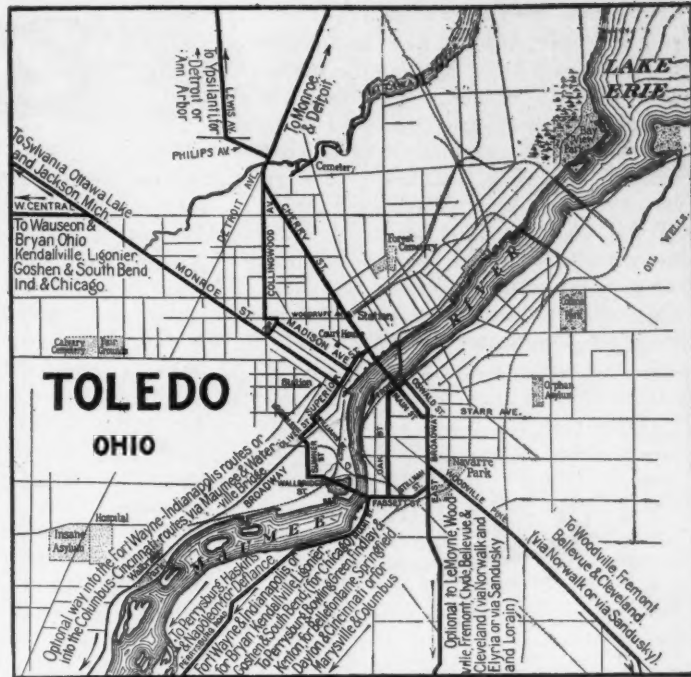
THE ROUTE OF THE MOTOR CAMPING TRIP



IT IS SURPRISING HOW EASILY THE OUTFIT CAN BE STOWED ON A CAR



MOTOR ROADS IN AND ABOUT INDIANAPOLIS



TOURING ROUTES OF TOLEDO

route outlined in the map on page 22 of the issue of Motor Age for May 25.

For alternate routes to Kansas City you are referred to the map and communication on page 24 of Motor Age, issue April 6, showing a Glidden tour route, also the original river-to-river route across Iowa. Total distance, Chicago to Fort Worth, Tex., via St. Louis, is 1,410 miles.

QUINCY TO KANSAS CITY

Quincy, Ill.—Editor Motor Age—Will Motor Age kindly advise me through the Routes and Touring Information Department as to the most direct route from Quincy, Ill., to Kansas City, Mo.? I don't mind hills—they all look alike.—Reader.

From Quincy travel south to the Mississippi river bridge and cross to Hannibal either by the bridge or by ferry. From Hannibal motor to New London, Frankford, Louisiana and Bowling Green over a gravel road. Continue on through Curryville, Vandalia, Ladonia, cross the Chicago and Alton railroad; go south 5 miles to Jim Scott's house and on to Mexico. Now you are on the main traveled thoroughfare between St. Louis and Kansas City, and follow through Thompson, Centralia, Sturgeon, Clark, Higbee, Yates, Armstrong, Glasgow, Slater, Marshall, Mount Leonard, Blackburn, Corder, Higginsville, Mayview, Odessa, Oak Grove, Grain Valley, Independence, Centropolis and Kansas City. At Glasgow you will have to ferry across the Missouri river and it will cost \$1.

CHICAGO TO LAKE RIPLEY

Chicago—Editor Motor Age—What is a good route to Lake Ripley, near Cambridge, Wis.?—C. I. Alward.

One of the most popular routes out of Chicago to the Wisconsin resorts is the Elgin route, which Motor Age suggests for the trip from Chicago to Lake Ripley. Leave Chicago via Garfield Park to Oak

Park, thence Addison, Bloomingdale, Ontarioville, Elgin, Algonquin, Crystal Lake, Ridgefield, Greenwood, Hebron, Lake Ge-

neva. Continue over good gravel or dirt roads through Elkhorn, Millard, Park Prairie, Whitewater and Atkinson.

Hints For Your Next Tour

Cincinnati, O.—Editor Motor Age—

Don't start out simply to reach a goal. Remember that many a side-road is far prettier than the much-traveled pike. Be willing to stop here, and there, at such a one,—and ask the people living near about it. You may not reach the goal as quickly, but you will come back having seen far more that's really worth the seeing.

When near a farmhouse, slow down a bit and look about you. After a trip is made and done, it is the novel and interesting things worth telling about that are the pleasure for you. At a rate of a mile in 2 minutes, you will not see the bird-houses, made of swinging gourds, or how the sage blooms, or how that well-house is made from an old wine-cask.

Somewhere in the car keep a record of its trips. It will be interesting to settle discussions, and it saves time, jotting in, now and then, on duller sections, rather than awaiting evening, when you are tired, disgruntled and ready for bed.

Down in the 10-cent store they have a little pocket filter—just a piece of tubing into a glass bowl full of what looks like sand, and another tube out at the bottom, and it fits in your pocket. When you drink at this, that and the other limpid brook or falls, it will not spoil the taste to run it through the filter.

Keep a supply of films some place in the car. Often the prettiest pictures present themselves after you have taken the last on the roll you started out with.

It is not a bad idea, if you have the room, to offer some intelligent wayfarer a lift, as you whizz up to him. He knows the country-side and the facts he will tell you more than repay the slight extra haul you must make.

Do not go on a tear that is just inside the speed limit, through the villages. Instead, stop somewhere, if it's only in front of the group of men discussing crops, at the corner, and ask: "Anything interesting 'round here?" There isn't a hamlet in the country, probably, that hasn't its story—whether it's a five-legged calf, a twin tree, or the largest patch-work quilt in the state. It is much more interesting and sounds better to come home and tell of these, than simply to rattle off, like a depot porter: "We went through Abbeville at 10, Batesville at 10:05, Cottontown at 10:07, and so on.

A well-stocked lunch-basket is never amiss, but do not let it keep you from sampling a tavern dinner in every place you strike at meal-time. If so, you will miss the best country chicken, best vegetables and so forth, you ever tasted.

When coming into a strange city, and about to do sightseeing, follow the plan magazine travelers use. Strike for the end of town, take the first street east and west, and go its length. Then up one square and down the next, and so on. Half the interesting things of every large city are not listed in the guide books, and you can resort to the others in good time.—Felix J. Koch.

CHANGING WATER SYSTEM

L A CROSSE, Wis.—Editor Motor Age—Kindly advise me through the Readers' Clearing House if Motor Age thinks I can use the thermo-syphon system of cooling on my 1905 24-horsepower Packard engine without expensive changes. There are plates on both sides of the cylinder so I can use larger piping if necessary, but are the water-jackets large enough and is the radiator suitable?—C. B.

Motor Age has no record of a case where the pump has been eliminated from

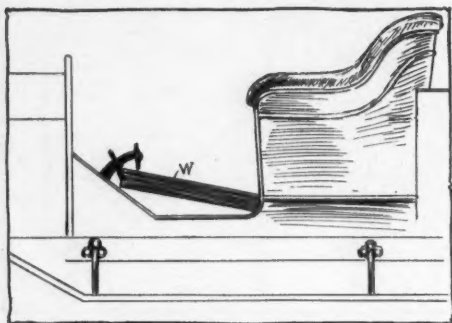


FIG. 1—HOLDING OUT CLUTCH

the cooling system of a 1905 Packard for the purpose of changing it into a thermo-syphon system. Therefore, it is a subject for experiment. It is hardly possible, however, that the proper cooling efficiency would be obtained by simply enlarging the piping, though it is possible that by enlarging both the piping and the radiator sufficiently good cooling efficiency might be obtained.

SUGGESTION FOR GARAGE

Sargent, Neb.—Editor Motor Age.—I am acquiring many valuable pointers from Motor Age and find the Readers' Clearing House columns particularly interesting. I wish to build a public garage sufficient to accommodate ten motor cars besides office and repair shop space. We now have twenty-five cars in the town, all housed in private garages. The prospects of more for the coming season are good, as there is a population of 800 and no public garage. I would be glad to receive plans and dimensions covering the office and shop, and suggestions for a power and tool equipment, heating and lighting, and storage for accessories, oil, etc.—W. T. Cropper.

The following description of the Parkside garage, Buffalo, and the ground plan shown in Fig. 2, may be of assistance to you. This building is a substantial one constructed of brick with steel beams and trusses, floors of concrete having 5,000 square feet of space, and capable of accommodating from thirty-five to forty cars. The garage is nearly fire-proof, as the only wood used in the construction is in the office and roof. The office is situated at the left of the main entrance.

The gasoline is stored in a 300-gallon tank, sunk in the ground 3 feet from the surface and is piped to the garage. A self-registered Bowser pump is used for drawing, measuring and checking the gasoline. Three



grades of oil, light, medium and heavy, are kept in three 60-gallon tanks in the right rear corner of the main floor. Steam is used for heating the building, the furnace being in the repair shop department, or forge room, shown in the ground plan. The illumination is provided at night by incandescent and tungsten lights, and drop cords may be attached when required to convenient sockets which are installed for the purpose. The repair shop occupies the end of the building and has a floor space of over 1,000 square feet, giving ample room for at least five cars. There is a large bench at the back of the shop and the machine tools, including lathe, emery wheel and drill press, are at the right. The power for the machine tools is supplied by an electric motor. Three fire extinguishers are provided on the main floor and one in the repair shop.

OPERATION OF SPLITDORF SYSTEM

Hoopeston, Ill.—Editor Motor Age—Through the Readers' Clearing House will Motor Age kindly answer the following questions:

1—I have a Flanders 20, and the clutch sticks, making it very difficult to disengage after being in a short time. Kindly suggest a remedy.

2—Please explain in detail the wiring system of the Splitdorf coil and magneto used on the above car. I do not understand a non-vibrating coil.

3—How is the best way to adjust a carbureter? I have had difficulty in getting power.

4—Kindly explain the construction of the McCord radiator.—R. B.

1—In the Readers' Clearing House, Motor Age, for February 23, 1911, page 28, will be found the remedy suggested for a similar trouble. In case you do not wish to remove the clutch, the application of castor oil can be made without disassembling the parts. After applying the oil allow it to stand over night with the clutch out. A stick of wood, W, placed as shown in Fig. 1, will keep the clutch disengaged.

2—The method of wiring the Splitdorf ignition system is illustrated in Fig. 3, and a diagram showing the electrical connections involved and the mechanism used is given in Fig. 4. The principal feature

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

in which the nonvibrating coil differs from the vibrating type is in the method of interrupting the primary circuit by which the high-tension currents are induced in the secondary winding of the coil. The vibrating type of coil is supplied with an interrupter in which the contact is broken through the attraction of the iron core, which becomes a magnet through the influence of the primary current passing around it. When the primary circuit is opened by this means, a spring causes the vibrator to again close the circuit and the process is repeated indefinitely as long as current is supplied from the battery.

In the nonvibrating coil the interruption of the circuit is accomplished mechanically, usually by means of cam-operated circuit-breaker like that shown in Fig. 4. The coil, having the interrupter separate, is merely a transformer.

The magneto used is that having an armature with but one winding and giving a current of comparatively low tension. The current is discharged through a transformer having a low and a high tension winding somewhat similar to a regular spark coil. This steps the current up to a voltage sufficiently high to enable it to jump the necessary gap between the points of a spark plug in the compressed mixture in the cylinder of the motor. The plain H or shuttle armature of the magneto is mounted between two annular ball bearings. One end of the shaft is the driving end and the other is equipped with the breaker cam and the insulating plug which delivers the current generated in the armature to the collector brushes from which it goes to the transformer connection.

From A the armature current goes through the switch and the primary of the transformer, and the circuit being broken at the proper moment a very high voltage current is induced in the secondary winding of the transformer, and being delivered to

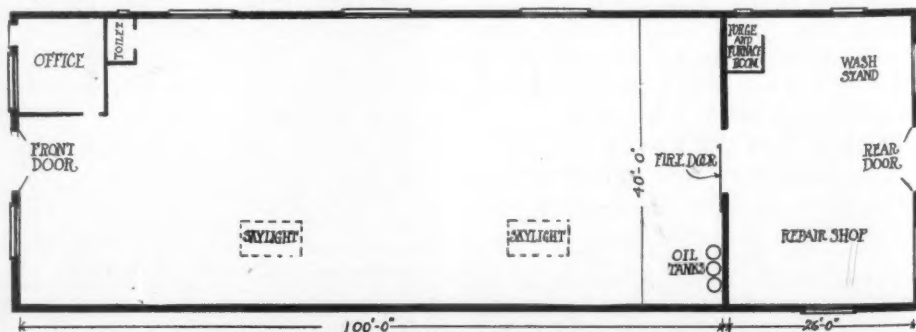


FIG. 2—FLOOR PLAN OF PUBLIC GARAGE

Clearing House

EDITOR'S NOTE—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated.

the heavily insulated cable is conducted to the central brush of the distributor, whence it is delivered to the spark plugs in the different cylinders in sequence.

In addition to using the current from the magneto the transformer is used as a spark coil by using the breaker mechanism of the magneto as a circuit-breaker to interrupt a current from the battery, which can be switched in for starting purposes or for an emergency. The distributor is used to deliver the current thus generated to the spark plugs. This gives a dual system with

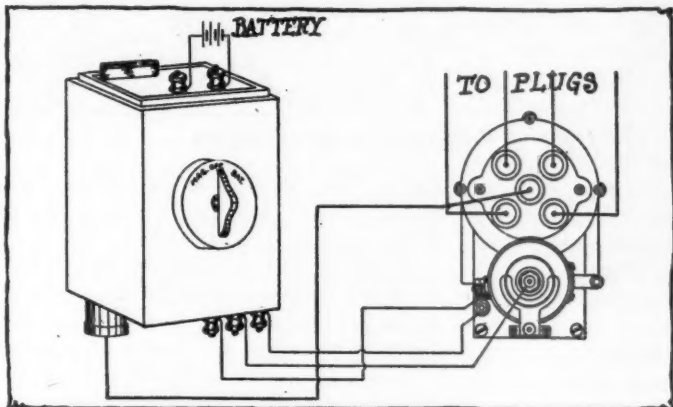


FIG. 3—CONNECTIONS OF SPLITDORF MAGNETO AND COIL

one set of spark plugs, and the simple movement of the switch controls both systems.

3—The only adjustment on the carbureter of the Flanders car is that of the auxiliary air valve. This is located directly above the float chamber and below the throttle valve. To give the carbureter more air loosen the thumb locknut on the valve stem and turn the valve stem to the right. To give less air loosen the locknut and turn the stem to the left. To adjust the mixture, while the motor is running with the throttle lever about one-fifth open, turn the auxiliary air valve stem to the left, not more than five turns. Turn valve stem slowly to right till the motor runs best.

4—The McCord radiator is of the vertical tube type with continuous horizontal fins. This type of radiator was illustrated and described in the Readers' Clearing House, Motor Age, for March 16, 1911, page 22.

REGARDING TIRES AND TREADS

Ellenville, N. Y.—Editor Motor Age—Through the Readers' Clearing House will Motor Age answer the following questions:

1—Is it a fact that a steel-studded tread placed on a motor car tire casing demands

more power from the engine to drive the car than was needed before the tread was put on? If so, why?

2—Either a 32 by 4 or a 34 by 5-inch casing will fit the wheels on my four-cylinder car of 32 horsepower. With which will the car run easiest, on the level, or climbing grades? With which tire will the car run 20 miles an hour on least gasoline, and why?

3—Which will require the most engine power to drive the car, a 5-inch tire or a 3-inch tire, the outside circumference being the same?

4—I have been using Woodworth treads and have removed them because they seem to demand one-third more effort from the engine than the rubber tires; size of tires and treads 32 by 4 inches. They seem almost indestructible and impervious to puncture. The car rides much harder with these treads. — W. C. McNally.

1—Yes, a trifle more power is required because of the additional weight and the slight increase in the diameter of the tire, but hardly enough to make it worth considering for ordinary driving. In fact, on sandy roads or

4—Your assumption that the tire protectors referred to require as much as a third more power than the tires without the treads is hardly a true one, though Motor Age has no record of the difference that these tire protectors really would make. Information from any readers who have had opportunities of making actual tests with tires of this description would be gratefully received.

FITTING LIMIT STRAPS

Walker, Ia.—Editor Motor Age—I should like the following questions answered in the Readers' Clearing House:

1—In applying limit straps to front and rear springs on an E-M-F touring car, how much slack must I give them when the car is not loaded?

2—Kindly explain the term of pipe-claying tires, the material and how to proceed.

3—How shall I repair my wheels without removing all paint? They are scaling in a few little spots.

4—Where can I buy a steering wheel ignition switch for both battery and magneto and how apply to Splitdorf non-vibrating coil?—A. G. Gary.

1—When applying rebound straps to the front and rear springs of an E-M-F touring car with body load only, the straps should be adjusted to give about 1 inch slack for the rear springs and $\frac{3}{4}$ inch for the front. This will give, with an average five-passenger load, $2\frac{1}{2}$ inches in the rear and 1 inch slack in front. The manufacturers recommend the use of a strap about $2\frac{1}{2}$ inches wide, having a buckle with a double tongue, the take-up holes in the strap to be about $\frac{1}{2}$ inch apart.

2—Motor Age has no record of the term pipe-claying tires, but ventures to suggest

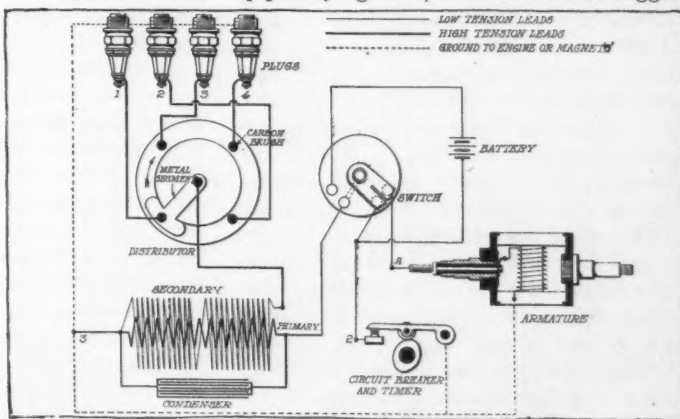


FIG. 4—ELECTRICAL CIRCUIT OF SPLITDORF SYSTEM

muddy ones any increase in the diameter of the tire is advantageous.

2—The 34 by 5-inch casing would be the most practical for all-round use. As above stated, the larger tire will run easier on sandy or muddy roads, and being of larger diameter the motor will turn over a fewer number of times for the required distance, so that less gasoline would be consumed. Another advantage of the large tire is that better wearing qualities are obtainable from it and it has a greater cushioning efficiency, which is beneficial to the mechanisms of the car.

3—On hard and smooth roads the larger tire will require more power to drive than the smaller tire. This advantage, however, is only to be considered in racing where speed rather than endurance is required.

that it might be the term giving the practice of applying a pipe-clay preparation to the surface of the tires to give them a clean, neat appearance. There is a preparation called Slikup, made by N. B. Arnold, Brooklyn, N. Y., which is used for this purpose, and it also is claimed that this substance has a preserving quality. It is a light gray creamy liquid, and is applied with a brush after washing the tires.

3—Scrape off the loose paint, thoroughly sandpaper the parts from which the paint is chipped and also the paint adjacent

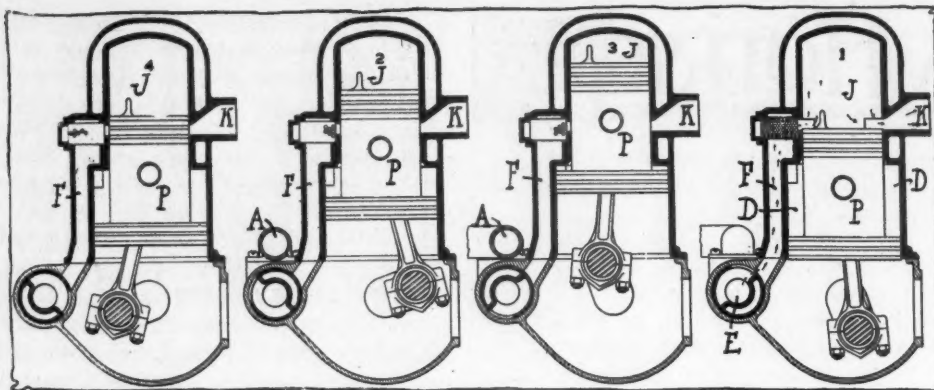


FIG. 5—RELATIVE POSITIONS OF ELMORE PISTONS

these parts; apply a couple of coats of lead to build up and follow respectively with coats of color, color varnish and finishing varnish. Unless you have had some experience at this kind of work, it might be advisable to have a painter do it. Repainting of the wheels might be required.

4—Motor Age has no record of a steering wheel switch that is applicable to the type of ignition system to which you refer.

THE VALVELESS ELMORE

Sturgis, Mich.—Editor Motor Age—Through the Readers' Clearing House will Motor Age answer the following questions?

1—Explain the valveless Elmore, or how it works without valves.

2—What ignition system is used on the valveless Elmore?—A Subscriber.

1—The Elmore motor is a valveless one, for a valve is a lid, plug, or cover applied to an aperture so that by its movement, as by swinging, lifting and falling, sliding, turning, or the like, it will open or close the aperture to permit or prevent passage, as of a fluid. In the Elmore motor the piston uncovers apertures in the cylinder wall, and thereby performs the function of a valve. In the model 46 Elmore engine, illustrated in Figs. 5 and 6, the incoming gas is drawn into the annular chamber D of cylinder No. 1 during the downward stroke of the piston P; the gas or fuel mixture passing from the carbureter through the manifold A into the distributor E, then through the distributor port B and bypass C into the annular chamber D; at the time that gas was being drawn into the chamber D of cylinder No. 1, the gases in chamber D of cylinder No. 3 were compressed, the crank of this piston being on the opposite cycle in that of cylinder No. 1, thus forcing the new gas through the bypass of cylinder No. 3 into the distributor, which has now changed its position to admit the new gas, and on through the port bypass F and port H into the combustion chamber J where, upon being compressed, the gases are ignited and escape through port K at the conclusion of the downward stroke of the piston. The cross sectional drawing in Fig. 6 represents the cylinders as if cut through the center of the bypasses C by which the gas goes to the distributor E; and the

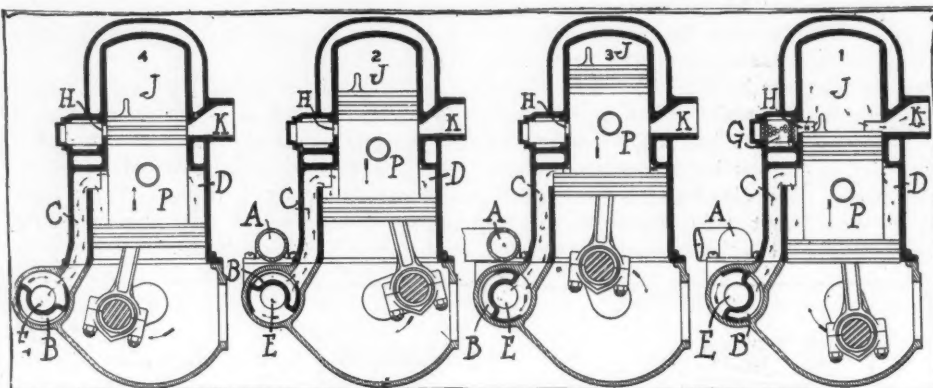


FIG. 6—POSITIONS OF PISTONS OF ELMORE MOTOR

cross sections of Fig. 5 represent the cylinders cut through the centers of the bypasses F by which the gas passes from the distributor to the cylinder.

2—The Atwater Kent ignition system is used on the Elmore cars.

MOTOR REFUSES TO STOP

Los Angeles, Cal.—Editor Motor Age—I would like to have the following questions answered:

1—I would like to know some of the causes that would make a motor continue to run after the switch is thrown off on a Bosch horizontal dash coil. It is one of the latest types of the Bosch coil, such as is used on the Oldsmobile cars.

2—Describe how the currents are generated in a high-tension Bosch magneto. By that I mean how does the primary current get to the secondary winding? I have heard that neither of the ends are connected together.

3—Describe how a master vibrator operates and what is meant by the shunt circuit, such as is used in the Delco system. I have heard that when the circuit is broken by the circuit breaker that some of the current goes into the condenser. If so how does that current get out so that it makes the secondary current stronger and makes a better spark. I may be wrong in this, but thought I would ask, as I do not understand the condenser.

4—I would like to know how the storage battery is recharged, and also have the inside of one described, naming the parts that are inside.

5—How does a Klaxon horn operate?—E. T.

1—The fact that the motor will not stop when the switch on this coil is thrown to the off position may be due to loose connections at 2 or 4 in the magneto or coil in Fig. 7, or that the steel spring leading from point 2 on the magneto does not make proper contact with the center screw. Either of these causes will result in failure to short-circuit the armature, which is necessary to stop the motor.

2—This point was explained in the Readers' Clearing House, Motor Age, issue of February 9, 1911.

3—The operation of the Delco system was described and illustrated in these columns of Motor Age for April 6, 1911, pages 22

and 23. The operation of the condenser was explained and illustrated on page 22 of Motor Age for May 4, 1911.

4—The method of charging storage batteries was discussed on pages 88 and 89 of Motor Age for January 5, 1911. The elements of a storage cell consist of a series of lead plates, some of which are positive and some negative, there being always one more negative than positive plates. All the positive plates are connected together as are all the negative plates. These plates are really lead grids with pockets cast in them containing the oxides of lead which is the active material. These plates are immersed in a solution of sulphuric acid in water, termed the electrolyte.

5—The mechanism of the Klaxon signal consists of a small electric motor M, Fig. 8, which rotates a ratchet wheel W, this in turn striking a projection on the disk D, causing it to vibrate rapidly and produce the characteristic sound.

LOCATION OF TRANSMISSION

Logansport, Ind.—Editor Motor Age—Through the Readers' Clearing House will Motor Age kindly answer the following questions?

1—Will a motor of 3¼-inch bore and 4½-inch stroke develop as much power as one with 4-inch bore and 4-inch stroke, everything else being equal?

2—Is an en bloc motor considered as durable as a motor of any of the other types?

3—What are the advantages and disadvantages of mounting the transmission on the rear axle?

4—Is a transmission mounted on the

rear axle considered as durable as one mounted amidships? Would think the severe vibration would be very detrimental.

5—Is it not a fact that a long-stroke motor will outlive a square motor?—M. H. M.

1—The A. L. A. M. formula, which is the accepted method of rating motors for horsepower, does not consider the length of stroke, the rating being based on the bore at an assumed piston speed of 1,000 feet per minute. On this basis the first motor has a rating of 5% horsepower for each cylinder, while the other with 4-inch bore is rated at 6% horsepower per cylinder. There is no generally accepted formula which involves the stroke, but the relation between the power developed by two cylinders can be obtained very closely by comparing the piston displacements. Thus, the displacement of a cylinder 3 3/4 by 4 1/2 is 198.8 cubic inches; while that of a 4 by 4-inch cylinder has a displacement of 201.1. On this basis, it will be seen that the power developed by the two cylinders is very nearly the same.

2—En bloc motors are as durable as those with the cylinders cast separately or in pairs. The principal disadvantage is that in case it is necessary to replace any one of the cylinders an entire new set must be obtained.

3—Some of the arguments are that the location of the transmission gears in a unit with the rear axle produces a more correct division of the weight between the front and rear axles than is obtained with other locations, and better adhesion of the driving wheels to the road surface is assured. Lighter drive shafts and universal joints can be used than would otherwise be safe, for the twisting moments transmitted through them never are greater than those of the motor as the multiplication occurs at the rear axle. The support of the pinion shaft can more easily be provided for. Arrangements can be made for driving direct at all gear ratios.

Among the disadvantages that have been cited against the location of the gearset as a unit with the rear axle is that the attachment of the gearbox to the rear axle housing subjects the tires to

heavier uncushioned shocks as the weight of the rear axle housing is increased. It is considered more difficult to design the gear-shifting linkages between the gearbox and the control lever because they move with the axle. The axle must be more substantially built because the additional weight is applied at the center of the axle. The gears and clutch are not usually so accessible in this construction.

4—The transmission usually is subjected to severe vibration and its life thereby is shortened. If correctly designed, however, it should be as durable as the ordinary life of a car will demand.

5—Other things being equal, it is probable that a long-stroke motor will outlive a square motor. This was discussed in Motor Age, February 16, page 34.

FOUR-WHEEL-DRIVE PLEASURE CARS

Milwaukee, Wis.—Editor Motor Age—Referring to the communication of Carl C. Uhl, Benson, Minn., on page 25 of your issue of May 25, I am under the impression that the Four Wheel Drive Auto Co. of Clintonville, Wis., is now building a touring car incorporating the Zachow-Beserdich four-wheel-drive and has issued several cars of this type. The company proposes to build four-wheel-drive pleasure cars on a large scale when its new factory is completed within a short time.—Leonard E. Meyer.

CORRECTS CONDENSER POINTS

New York—Editor Motor Age—I must beg to take exception to your reply to "Iroquois" in your issue of May 4 regarding object of the condenser as used in ignition of spark coils. There are several errors in your explanation and I fear that numerous people may be misled by same. In justice to yourself I must admit that most textbooks give the explanation as you do, but the fact remains that the explanation is incorrect in this particular part, namely the condenser.

Referring to your explanation, you say: "But when the condenser D is connected across the breaking point the static charge of the electricity generated by the break is stored up in the condenser," etc.

Taking up your explanation point by point, I beg to at first advise that the

spark observed at the platinum contact points is not static by any stretch of imagination, but is dynamic and has a voltage ranging from eighty to two hundred volts. This increased voltage is caused by the collapse of the magnetism in the core. When a condenser is connected, as shown in your sketch, this spark is absorbed by the condenser as there is only a limited amount of current and as there is sufficient capacity in the condenser this surge of current finds a reservoir, so to speak, to flow into. As the condenser becomes more highly charged the primary winding becomes more discharged, so that the condenser now instantly surges or discharges back from the primary winding, but in the reverse direction which tends to and does demagnetise the iron core much more quickly than would be the case if no condenser were used.

A little thought will show that the more quickly or suddenly the magnetic collapse of the iron core, the more voltage will be generated in the secondary winding. The error in your explanation is that you say that the condenser does not discharge until the points have come together after break. A little thought will clearly show, if you will refer to your sketch—which is correctly wired—that if the condenser did not discharge until the platinum points had made contact there would be a dead short circuit at R and V. That is there would be a dead short-circuit across the points for the current given back by the condenser and would not circulate through the primary winding.

I trust you will see fit to make this correction. I consider the articles in Motor Age to contain real meat and are well worth reading.—L. T. Rhoades.

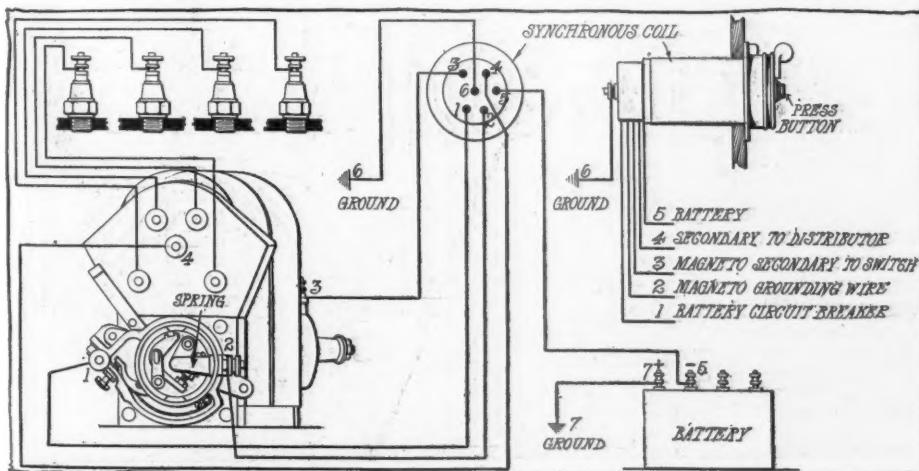


FIG. 7—BOSCH SYSTEM SHOWING CAUSE FOR MOTOR NOT STOPPING

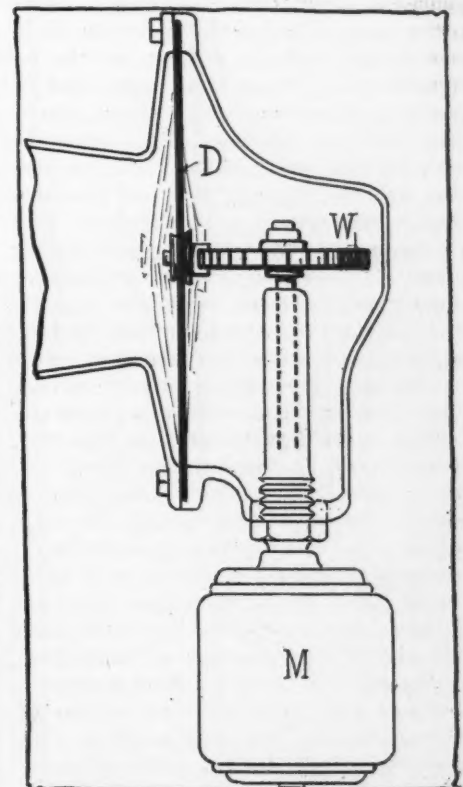
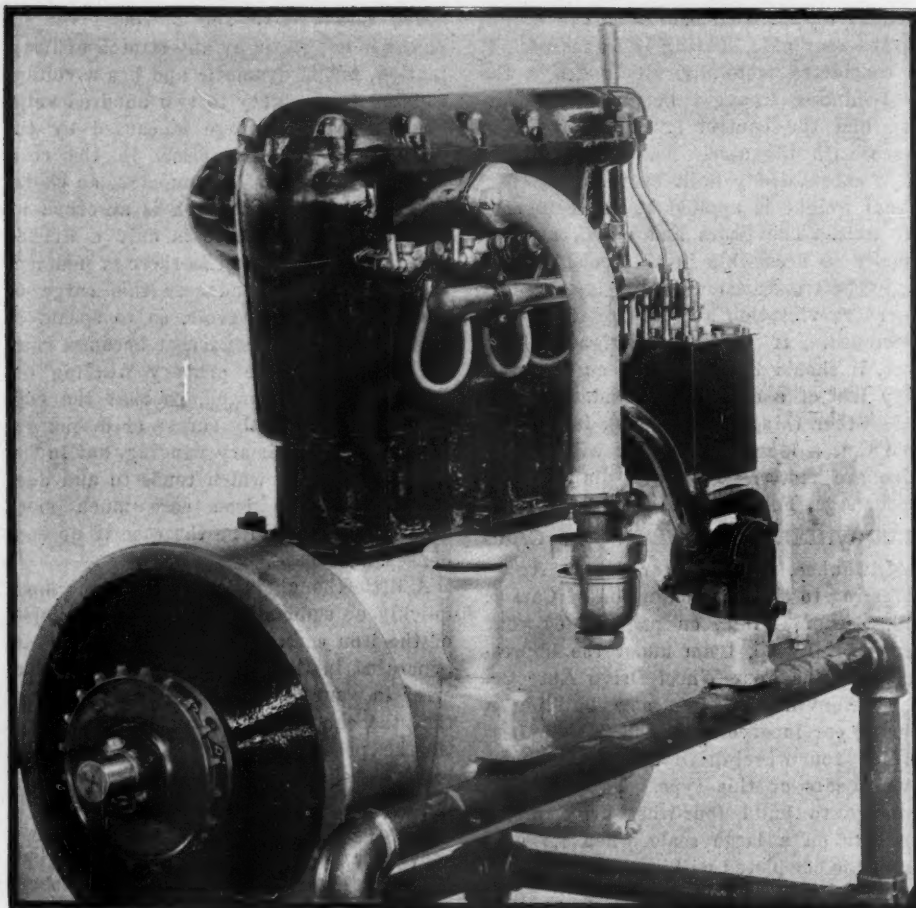


FIG. 8—MECHANISM OF KLAXON HORN



INTAKE SIDE OF REYNOLDS ROTARY VALVE MOTOR

THE chief points urged against the ordinary four-cycle motor is its complication, especially as regards the valve mechanism. With the usual tappet valves there always is necessary the valve-grinding, valve-timing, adjustment of push rods, replacement of cams and springs which often prevent successful operation by a novice and make it difficult for the ordinary man to handle them without the occasional aid of an expert. There also is the feature of the minor noises due to the reciprocating parts of the valve mechanism and the jars and jolts and vibration due to the starting and stopping of these reciprocating parts. Further, with spring operated valves positive valve-timing at high speeds is almost impossible.

Urged by these considerations many designers have attempted to utilize valves which have a continuous rotary motion. The latest of these rotary valve motors is known as the Reynolds motor and has been brought out by the Reynolds Motor Co. as a four-cylinder engine. It is unique in several features and its design is the result of 2 years' experiments under the supervision of Howard E. Coffin, of the Hudson forces, and three other prominent engineers. Extensive plans have been made for wholesale manufacture and marketing.

A number of Detroit's most prominent business men are directors and officers of the corporation, which is capitalized at \$100,000. M. J. Murphy, president of the Murphy Chair Co., also Security Trust Co.,

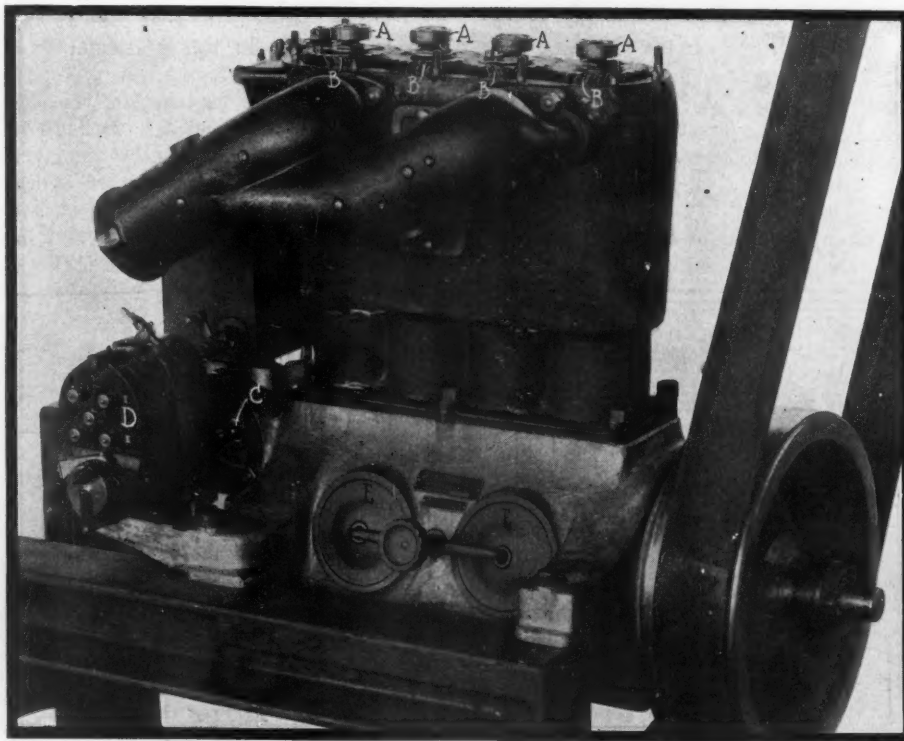
is the president. The vice president, Walter S. Russel, is also president and general manager of Russel Wheel and Foundry Co. The secretary and treasurer is A. MaComb Campau. The board of directors includes the following: Howard E. Coffin, vice-president and consulting

The Reynolds Rotary Valve Motor

engineer, Hudson Motor Car Co.; Cecil H. Taylor, consulting engineer E-M-F Co.; Guide G. Belm, executive engineer Hudson Motor Co.; George H. Cheney, formerly factory manager of Westinghouse Machine Co. and Barber-Colman Co.; Herbert C. Sadler, professor of naval architecture, University of Michigan.

The Reynolds motors are at present being manufactured in quantities for marine purposes and many of them are being supplied for tests in pleasure and commercial motor cars. Plans are being made to manufacture a motor of the same design especially adapted for vehicle use.

As for the construction of the motor, the illustrations will give an idea of the main features. The horizontal cross shaft C in the front end of the motor is driven by means of spiral gears from the crankshaft and in turn drives the magneto D on one side and the water pump on the other. Incidentally, this cross shaft also is made to drive the oiler through the medium of an eccentric on this same cross shaft. A ver-



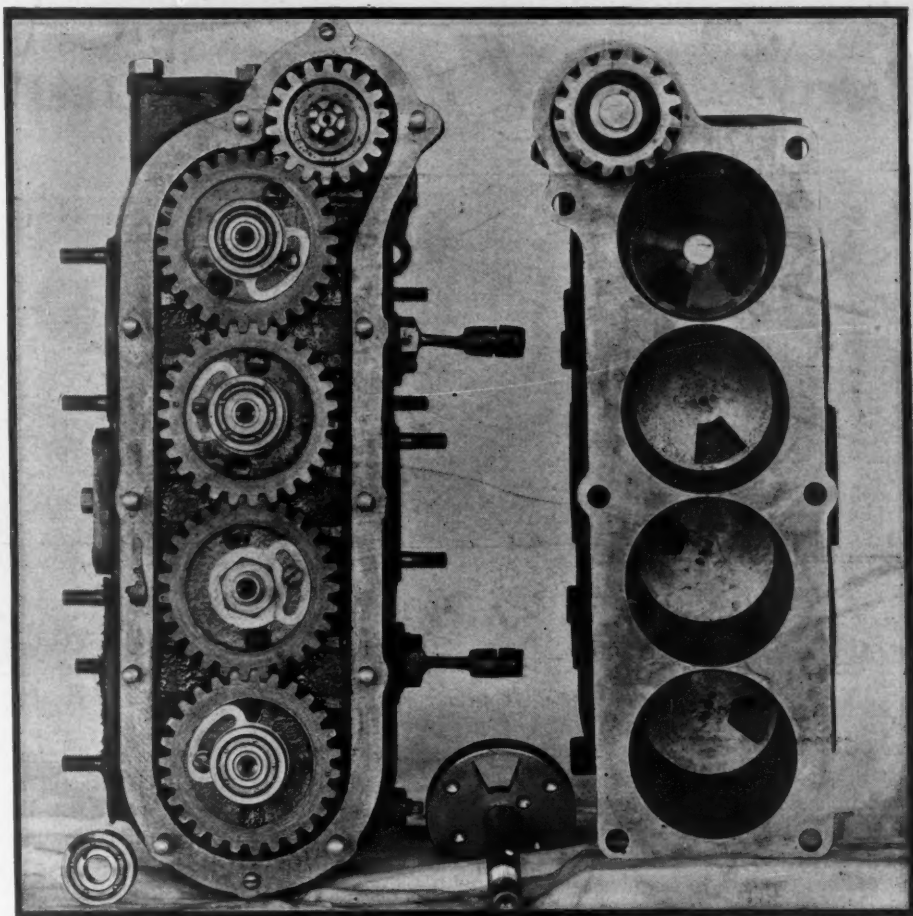
EXHAUST SIDE OF REYNOLDS MOTOR

Howard Coffin Back of New Engine Idea

tical shaft also at the front of the motor carries a spiral gear which meshes with another at its lower end on the horizontal cross shaft. The position of this spiral will be seen on the view of the bottom of the cylinders at the left of one of the illustrations.

The vertical shaft carries a spirally or angularly cut gear at the top of the cylinder which meshes with the first of the train of four gears B which transmit the valve drive across the heads of the cylinder to the individual valves connected at A. The valves are heavy disks which conform in shape with the head of the cylinder and their construction is shown at the right of one of the illustrations. At the left of the same illustration is shown the cylinder cover, in which are carried the gear on the top of the vertical shaft and the train of gears across the top of the cylinders which operate the valves. A two-bearing crankshaft is used and this crankshaft with its connecting rods is shown in one of the illustrations. The connecting-rod bearing bushings are of bronze with babbit linings. The crankcase is of aluminum and is provided with covered circular hand holes shown at E.

The rotary valve which seats against the head of each cylinder is allowed enough space so that there is at all times an oil



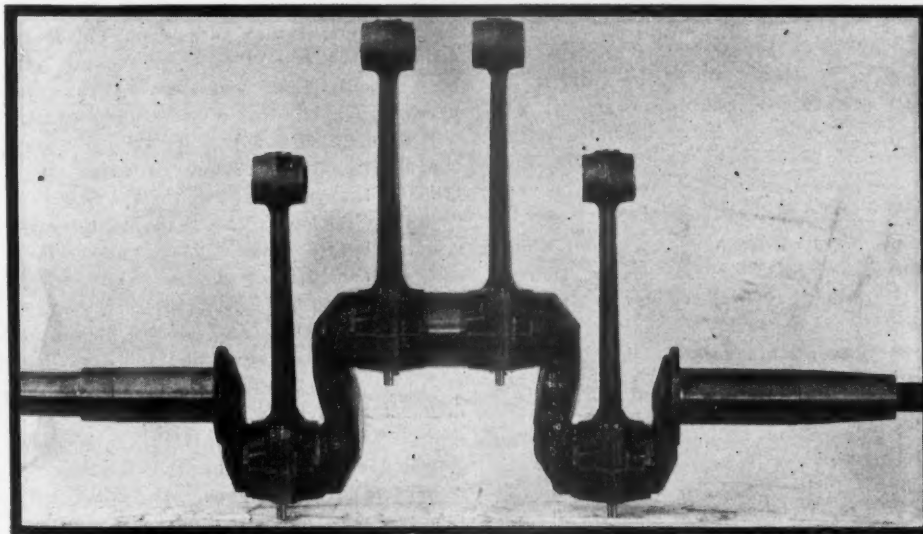
OPERATING MECHANISM OF ROTARY VALVES

film about .662 inches thick between the valve and the seat. While it is true that any sustained pressure against the underside of the valve will tend to squeeze the oil out, yet owing to the fact that the pressure of explosion lasts only for a small fraction of a second, and is immediately succeeded by suction, a sustained pressure is not maintained. Small holes are drilled in the faces of the valves to allow any particles of foreign material which might produce abrasion to collect in them. The segmental ports are generous in size. The opening instead of being annular as in

the case of the ordinary poppet valve is an open space and there is therefore no throttling of the gas or in pinching the stem or itself as in the case of the ordinary poppet valve.

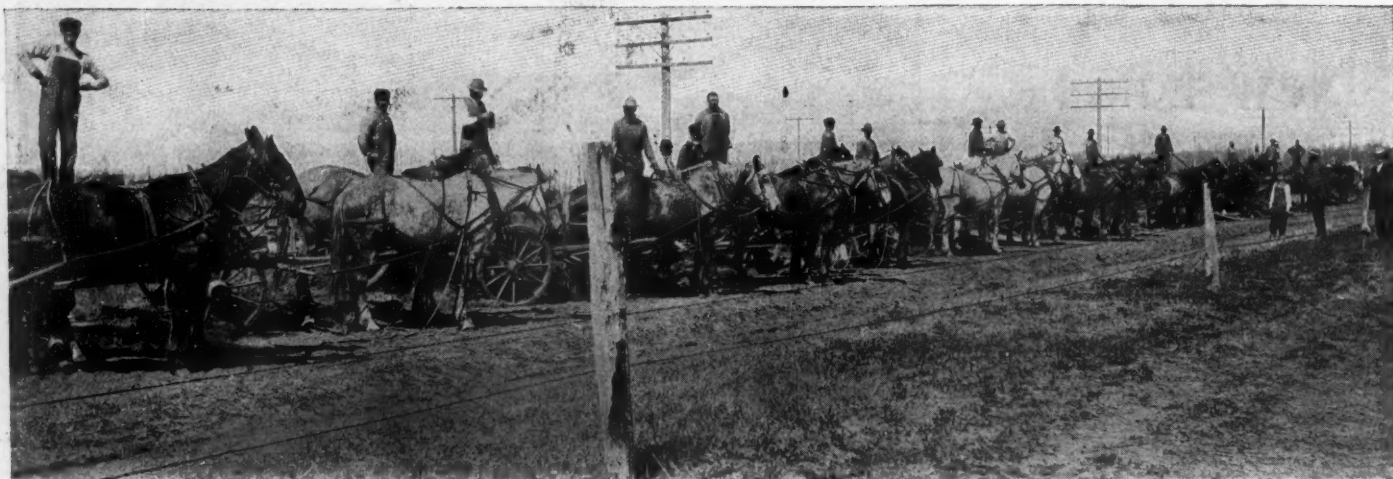
A unique feature in the design of this motor is the lubricating system; a force feed lubricator, driven from the cross shaft, supplying oil to each of the valves through pipes which enter into holes drilled in the cylinder cover. The location of the passages is such that the oil is led through them and dropped into the top of each one of the valve spindles, in such a way that it flows downward, lubricating the sides and face of the valve in a positive manner. The main bearings are lubricated by splash, the oil flowing down from pockets cast in the side of the crankcase. The waterjacket around the cylinders is extended to embrace the exhaust manifold and give a thorough water cooling of the exhaust gases as they pass through the pipe.

The general dimensions are interesting. The bore is $3\frac{1}{2}$ inches by $4\frac{1}{2}$ -inch stroke; the connecting rod bearings are $1\frac{1}{8}$ inches by $2\frac{5}{8}$ inches and the main bearings $1\frac{1}{8}$ by $3\frac{1}{2}$ and 4 inches, respectively; the flywheel is 14 inches in diameter with 4-inch face and is made in a dish shape, which permits its being placed very close to the crankcase; the entire motor is 31 inches in length over all and 23 inches in height; its weight complete with magneto is given at 370 pounds.



CRANKSHAFT AND CONNECTING RODS OF REYNOLDS MOTOR

From the Four Winds



TWENTY TEAMS BELONGING TO FARMERS WORKING ON ROADS IN MERRICK COUNTY, NEB

IDA COUNTY'S Record—Ida county, the smallest county of Iowa, has \$90,018 invested in motor cars, according to figures just given out by the county auditor.

To Signboard Route—The road from Chicago to Des Moines is to be marked the entire way with sign boards. The Chicago Motor Club will join with the officers of the River-to-River Road Association in placing the signs.

What Reciprocity Means—With reference to the Glidden tour invading Canadian territory, perhaps a number of manufacturers and others in the industry do not fully realize what the Canadian reciprocity agreement means. It is of far greater importance to the motor industry than the average man imagines. The reduction of duty on American-made cars from 35 to 30 per cent opens up a wider channel for

American goods to flow across the border. According to one prominent manufacturer, Canada within the next few years will be buying loads of cars of the utility type for use in its vast grain regions.

Membership Boom in Syracuse—The membership boom of the Automobile Club of Syracuse is now under full headway. The ambition is 1,000 members by September 1.

Testing Packard Six—A spectacular drive in a 1912 Packard six through the wilds of the Jackson Hole country in Wyoming and neighboring states by President H. B. Joy and party is the climax of test runs which have given the new six a total mileage in excess of 51,000. This figure is an impressive illustration of what is required of a Packard car before a new model is placed on the market, each successive year.

Money for Race Meet—The Wisconsin state board of agriculture, which is the managing board of the annual state fair in Milwaukee in September, has voted to offer \$2,500 in purses for a motor car race meet on the last day of the fair, which will be Saturday, September 16. It was at first intended to have the national circuit meet in Milwaukee during the fair, but this was awarded to the Milwaukee dealers and will be held on June 16 and 17.

Speed Trap Warning—Now that the outdoor season is on in earnest and touring is the order of the day, the country authorities are on deck, as usual, to trap the unwary motorist, a fact that has prompted the issuance of a warning by Secretary A. T. James, of the Quaker City Motor Club, calling attention to traps located at the following places in and adjacent to Philadelphia: "Broad street, above Cambria, Wayne, Hatboro, Ardmore and Haverford, especially on Sunday afternoons, Jenkintown, Middletown township. In the above-

mentioned places motorists will be required to blow their horns where there are notices to that effect and to at all times conform to the speed law, which is 24 miles an hour where there are no signs, and 12 miles where the signs read 'Danger! Run Slow!'"

Shingle Hill Plans—More than 100 entries, amateur and professional, are practically assured for the Yale hill-climb on Shingle hill, West Haven, Conn., Saturday, June 10. Last year the list of contenders almost equaled this number, while in 1909 there were no fewer than eighty-five entries. The fact that the Yale Automobile Club has joined hands with the New Haven Automobile Club in an effort to make this season's event a success assures a great programme.

Badger Tour Attractive—M. C. Moore, president of the Wisconsin State Automobile Association, on his return from the re-pathfinding tour for the second annual reliability run, July 17 to 22, 1911, found fourteen provisional entries on his desk, although the official blanks have not yet been issued. Last year twenty-three cars participated, but this number undoubtedly will be doubled and perhaps tripled under the additional inducement of three more trophies than were offered for the first run in 1910. Although the roads tentatively selected by Pilot Moore in November last showed considerable improvement when covered during the latter part of May, disagreeable weather and almost constant rains made the re-pathfinding work exceedingly disagreeable and the party abandoned the work at LaCrosse, Wis. The route from that point to Milwaukee is so well defined, however, that it is hardly necessary to cover it again. An added feature of the 1911 tour will be a hill-climb on the fifth day, the bluffs and hills of western Wisconsin between LaCrosse and Madi-



PACKARD OFFICIALS CAMPING AT JACKSON'S HOLE

son offering splendid facilities for a contest of this kind. The mid-summer or semi-annual meeting of the W. S. A. A. will be held at LaCrosse on the fourth day, which will be a holiday.

New Oregon Club—Salem, the capital city of Oregon, is to have a club. The following are the officers of the club: R. P. Boise, president; E. T. Barnes, secretary; A. Bush, Jr., treasurer; board of directors, Homer Smith, W. H. Eldridge, Ed Weller, Geo. F. Roggers, James Linn, F. W. Steusloff.

Virginians Interested—The Richmond Automobile Club met last week with representatives from along the route between Richmond and Gordonsville and perfected plans for the building of a motor road between the two cities. The club agreed to furnish \$10,000 for this purpose and half of this amount has already been raised. This movement is considered one of the best that has been set on foot in Virginia for motorists and residents along the route in several years. There has been a general awakening of the good roads movement in motoring circles of Virginia during the last year and efforts for like improvements are being made all over the state.

Portland Has Fine Record—That in the five months between November 1 and April 1, 1911, more cars were sold in Portland than in Seattle, Tacoma and Spokane combined is the record of state licenses issued in that period in Oregon and Washington. Portland heads the list with 369 sales of motor-driven vehicles, while Seattle dealers disposed of only ninety-eight machines and Spokane forty-nine machines. Tacoma made a still smaller showing. The trade in Oregon for the same period made a tremendous gain over that of Washington, with a total of 705 sales as compared with 308 sales in the state of Washington. These figures include sales only of cars that have been registered. In addition numerous sales were made to farmers who have delayed in securing state licenses. As this condition applies alike in both states, the new cars that have not been licensed as yet do not figure in the comparison of business. While the trade in Washington has been somewhat slack it is believed that business conditions in that state will improve steadily. One reason for the falling off of the trade is on account of a large

amount of last year's wheat crop remaining unsold. The farmers in Washington form a large percentage of motor car users. By the end of the year business conditions should be normal in Washington. In Oregon trade conditions are satisfactory.

Marquette Census—Five years ago a motor car in Marquette, Mich., was a curiosity. Now there are about sixty-five cars in the city, one to every 177 persons, and the number is steadily increasing. Dealers are predicting that more machines will be sold there during the next year than have ever been disposed of before in an equal period of time.

Signs of Michigan Prosperity—According to the increased demands for licenses at the secretary of state's department this year, the motor car business has not slackened to any extent. Secretary Martindale, in his report, stated that about 20,000 licenses have been issued already this year as compared with 18,000 last year and applications are coming in by hundreds. It is estimated that the department will issue 25,000 licenses this year.

Beach Meet—August 3, 4 and 5 are the dates that have been set for the annual race meet on Galveston beach, to be run in connection with the cotton carnival. M. O. Kopperl has been appointed chairman of the racing committee of the Texas State Automobile Association for this event. The last day of the races has been denominated Houston day, and will be specially attended by many of the drivers and owners of cars in the neighboring city. These prizes aggregate \$3,500 in cash, in addition to numerous cups. The races, as usual, will be held under the auspices and with the approval of the A. A. A. The races

can be held over a course 5, 10 or 20 miles in length, as the beach is perfectly smooth for 25 miles.

Club at Holland—The motor car owners of Holland, Mich., have formed a club with the following officers: President, Abraham Leenhouts; vice-president, John J. Cappon and Albert Lahuis; secretary, Arthur Visschers; treasurer, Fred Tilt.

Ohio Seems Satisfied—While the Ohio general assembly has not finally adjourned, still the usual recess has been taken before final adjournment, and it is known there will be no motor car legislation this session. Several bills were introduced in the body, most of which were brought to the final reading. One of the bills, that providing that no child under 16 years of age could drive a motor car in the state, was killed in the senate. An effort was made to secure an amendment permitting an owner, upon the payment of a small fee, to transfer his set of number plates from an old to a new car, but that failed of passage.

Club is Helping—The Milwaukee Automobile Club, working with the Citizens' Business League of Milwaukee, Wis., has started a project to improve the main roads from Milwaukee to the Waukesha lake region. It is estimated by engineers that \$250 will cover the expense of putting the roads into good shape by dragging and shaping. The lake region is a favorite haunt for Milwaukee motorists, there being no fewer than twelve large lakes in the territory, the center of which is about 35 miles from Milwaukee. Residents along the route have subscribed liberally to the fund that is being raised to cover the expense. The first unit to be improved will be the Pewaukee-Hartland road.



WORLD-TOURING HUPMOBILE IS GIVEN A BIG RECEPTION AT MANILA

The Use and Abuse of Motor Trucks

UP to a few years ago, the statement that within a limited time the greater part of the country's merchandise hauling would be done by motor power, not by horses, was regarded in the light of a pathetic utterance. Since then those pioneer business men who, ever alert for improvement in service and greater economy in upkeep, adopted power transportation, have taught the business community valuable lessons, until even the late skeptic no longer closes his eyes to the certainty that power transportation is the next logical step.

Horses represent a method of transportation so old that it was in vogue before the Christian era, and it is well that inventive genius has found a means of supplanting him. The demands of health, business and humanity are driving us to adopt other methods of transportation, more suitable to the requirements of the twentieth century than that of the days of Pharaoh.

City Traffic Conditions

This stereopticon picture shows a motor truck on West street and represents the condition existing all hours of the day. In the center may be seen an electric truck of $3\frac{1}{2}$ tons capacity, capable of carrying its full load at a rate of 9 miles per hour, yet unable to do so on account of the slow-going horses by which it is surrounded. In the right foreground is an empty single team occupying more room than the other and of a load capacity of only one-third the motor vehicle and with a correspondingly slower speed. You also will notice that to allow this wagon to draw up to the curb, the horse has to be swung to the left to avoid the vehicle ahead, with the result of interfering with passing traffic.

In New York more than 140,000 horses are used in daily trucking. Were this army of quadrupeds harnessed tandem fashion to a vehicle, the first animal would be entering the city of Worcester, Mass., or Scranton, Pa., before the wheels of the vehicle to which they were harnessed started to turn out of New York city.

Probably the majority of these horses could be entirely dispensed with by a substitution of the motor vehicle, thereby adding nearly 300 miles of streets to our city. What such an elimination of the horse and its co-partner, the fly, would mean to the health of the community is almost beyond record, and the enormous saving to the taxpayer only Commissioner Edwards and the political powers can tell.

A horse delivery wagon on the streets has an overall length of about 18 feet and occupies 90 square feet of area. To stable this outfit requires about 114 square feet of area. On the other hand the motor wagon of like-carrying capacity will average an overall length of about 10 feet, or 60 square feet of area whether on the street or in the stable, a saving of prac-

EDITOR'S NOTE—Charles E. Stone, of the Alden-Sampson Mfg. Co., spoke on "The Use and Abuse of Motor Trucks," May 16, at the opening of a new term of the motor school of the West Side Young Men's Christian Association, New York City.

tically one-third on the street and nearly 100 per cent in the stable, where the high rental value has to be considered.

A 3-ton horse truck requires about 22 feet overall on the street or 132 square feet of surface, and in the stable this will occupy about 204 square feet, but as many concerns own a spare horse for every such rig this storage space is increased thereby 54 square feet, or a total of 258 square feet. A motor truck of the same capacity would require only 126 square feet.

The 5-ton horse truck will require about 25 feet overall on the street, or 200 square feet of surface, and the stable space for this equipment would represent 281 square feet. A motor of equal capacity would require only 176 square feet.

While these figures show a very decided saving for the motor as against the horse, we must consider the fact that with increased speed the motor vehicle is capable of more miles per day travel and as conservative estimates show that it is doing two and one-half times that of the horse, as far as work is concerned, there would be a saving of street space of no less than 73 per cent, so that it will be seen that the same amount of work could be done with only about one-quarter of the street congestion, or that four times the present volume of traffic could be accommodated before relief measures would be needed.

Economy of the Truck

Another great economy effected through the use of self-propelled trucks, particularly in larger installations, comes through the great reduction in the necessary number of employes to look after and maintain the vehicles in running condition.

The past two years or more have seen an ever increasing demand for free suburban delivery, and it is necessary to send goods as far as 30 and 40 miles out into the country, making the use of motor trucks absolutely indispensable for the purpose.

During the winter months through the presence of snow and ice upon the city pavements, horse traffic is more often than otherwise at a complete standstill, owing to the inability of the animal to secure the necessary traction to pull its load, and while the self-propelled truck also is placed at a slight disadvantage, it is a rare sight indeed to ever see one completely stalled, but on the other hand often not only carrying its own load but towing a horse vehicle in its wake. In summer the great heat likewise affects the animal and renders it incapable of properly meeting the requirements of the service it is called upon to perform.

There is in addition to all this a certain amount of up-to-dateness connected with the use of motor-driven vehicles for delivery purposes, and many instances have come to my attention where customers of old established firms have changed their accounts to others, solely because the other firm used the modern method of delivery which they preferred to see draw up in front of their door.

The health department of the various cities is rapidly recognizing the menace to the health of the communities by the presence of stables, and is inclined to segregate these, placing the merchant at a disadvantage where his stable property has to be removed to some distance from the shipping-room; there can be no such objection to the presence of either gasoline or electric trucks, and in very many instances the elimination of the fly-breeding horse permits of the same property being used for warehouse or storage purposes with slight renovation and at the same time house the motor machine.

Weakness of Horse Service

The commercial motor vehicle, with proper supervision, care and inspection, is capable of almost constant profitable employment, whereas the horse cannot safely be used in continuous service for more than 4 or 5 hours per day.

A good motor truck in the hands of a knowing and careful driver is almost certain to mean economy to its owner, but the same machine with a poor or green man in charge and a shipping clerk to whom the rated carrying capacity of the truck means nothing, is too expensive for anyone to own.

Two years ago I had occasion to look at a large concern in this city which had a great deal to say against the general use of motor trucks and had done much to discourage others from purchasing. While the concern in question kept no very accurate cost accounts, it had enough, as it said, to tell if the machine was an economic method of delivery. In the investigation, one of the first items of expense encountered was a charge of \$175 each month, cost of current for charging the battery of one 5-ton truck. No one could explain how such a figure was arrived at and no itemized entries on the books were found to correspond to it. The items of repair and replacements footed up to about \$150 in money—the actual work being performed by the driver—yet the total amount of parts billed by the truck makers' factory in 14 months was \$240, and nothing had been purchased outside.

I was informed that the machine was to be laid up for an entire new set of tires, but investigation proved they were good for fully 2,500 miles more and did not require resetting. One day an alleged expert electrician who happened to be passing the garage of this concern informed the driver that he should always discharge the battery if he did not have occasion to use the truck for a day or so, so thereafter

on Saturday nights and other days when the truck was not to be used on the following day the driver would jack up the wheels and allow them to run until the juice was exhausted. This counted for the heavy cost for re-charging batteries.

Reason for Trouble

A Philadelphia concern once called me in to investigate an electric truck which it owned and which it was reporting as being no good. A thorough inspection of the vehicle, batteries, motor and controller showed nothing comparatively wrong and after personally seeing to the charging of the battery, we took the truck out the following morning and secured with load the mileage promised by the maker. The following day the same results were obtained. Deciding that all must be well, I left the machine in charge of their men, and a few days later again was called up by the owners and told the truck was showing the old inability to make deliveries. This time I happened to drop in late at night when some builders who were enlarging the top floor were busy, and the secret of the truck's failure then was explained. It seems that this concern received current from the street to operate the elevator during the day and that some bright genius among the builders, tiring of walking up and downstairs, conceived the happy thought of connecting up the vehicle battery with the elevator motor. Of course, no battery manufacturer could well guarantee that on a single charge his product would enable the truck to deliver goods throughout the day and run an elevator at night.

A Quaker Experience

Four years ago a large Philadelphia department store purchased four of these Mitchell-Daimler 1-ton trucks, but found that the service was so unsatisfactory that it decided to dispose of them for practically nothing and for over a year talked so strongly against self-propelled vehicles as to handicap the sale in that city.

A large department store on West Fourteenth street, hearing of this opportunity, purchased these machines and has had them in successful operation ever since. The trouble was not with the truck itself, as the fact that the Philadelphia owner placed them in charge of young men of 16 and 17 at a wage scale of \$8 a week, and expected these inexperienced drivers to run the vehicles from 6 in the morning till 7 at night, and then do whatever mechanical work was necessary in a tumble-down stable.

It is an unfortunate fact that the general public hear comparatively little about the many successful motor truck installations, the few failures are greatly enlarged and dilated upon with great injustice to the industry, and it is a fact borne out by investigation that the majority of such failures are not caused so much by imperfect design and material but are nearly always due to overloading, over-speeding, carelessness, neglect and abuse.

In the Realm of the Commercial Car

COMMERCIAL cars are making rapid headway for business purposes in the counties of Maryland. They are particularly in demand for passenger, freight and express purposes and already a number of lines have been established and are in operation in various sections of the state. One of the most important of these lines is that between Frederick and Libertytown, in Frederick county, a distance of 13 miles. A 1½-ton White truck is used for this service and, according to the owner, has replaced a stage coach and five horses. The owner furthermore claims that his earnings since the truck has been in service have increased two and a half to three times the amount realized with the operation of the coach and five. With the stage and five horses the highest amount taken in during a month was \$185, while with the truck the owner averages at least \$400 a month and frequently this amount goes as high as \$500 a month. The truck makes two trips daily, and the operating expenses, according to the owner, are no greater than they were with the coach and five.

Another line runs from Ellicott City to Dayton in Howard county, a distance of 14 miles, and a White truck also is used for this service. This service has proven so satisfactory that the promoters are contemplating the use of additional vehicles of a larger size so as to care properly for the increasing passenger and freight service. Other lines have been established recently in Worcester county and runs from Snow Hill to Pocomoke City, while still another in Cecil county runs from Elkton to various sections of that county.

Another Baltimore Recruit

The Consolidated Gas, Electric Light and Power Co., one of the most influential corporations in Baltimore, has reached the conclusion that there is a great future in this city for the commercial motor vehicles and that they also are far superior to the horse-drawn affairs for business purposes. This is particularly the case in regard to suburban work, for the company already has a 1½-ton White truck and a light White delivery wagon for conveying huge transformers and bundles of wire in these outlying sections. The gas company has found that by the use of these two vehicles alone it has been able to replace with each three or four horse-drawn wagons and has kept up to date with all orders. By the old method the company was often 4 months behind on orders. Each of these vehicles averages 50 miles a day and they make trips within a radius of 25 miles of the city limits.

The company also has received two electric power wagons, the first of a consignment of ten from the General Vehicle Co. of New York. These wagons are to be used for distribution purposes. Five of them are capable of carrying a live load of

700 pounds each, two of 1,000 tons capacity, one 2,000-pound truck, one 2-ton truck and one 3½-ton truck. The company purposes to use these wagons for its own purpose for demonstration and, at the same time, has announced that it is prepared to supply Baltimore's demand for electric commercial vehicles. In line with this policy the company is now completing its electric garage at 30 South Eutaw street.

Another Worm Gear Recruit

Worm gear drive has been adopted by R. G. Stewart, designer of the new Lip-pard-Stewart truck, a Buffalo product. The worm gear rear axle which was designed especially for this car is so built that the drive is practically a straight line from the motor to the rear axle. The housing is large and is so constructed that the entire mechanism—gears, bearings, etc.—can all be taken out by simply removing a round plate cover, withdrawing the live axles and unscrewing a few bolts. It is claimed for this rear axle that it is noiseless and free from vibration.

Wilmington's Funeral Car

A Packard funeral car, especially designed, has been delivered to the Interstate Cemetery Co., of Wilmington, Del., the owner of Lawn Croft cemetery, which is located midway between Wilmington and Chester, Pa. The body was built by Fulton & Walker, of Philadelphia. It is in two compartments, though it can readily be thrown into one. The front compartment, which is 8 feet 5 inches wide, the width of the entire body, and 3 feet between the front and the partition, is for the body, which is placed inside through a side door, while the rear compartment is for the accommodation of the funeral party up to twenty-four persons, who can be seated comfortably. The seats run at right angles to the sides of the car, with drop seats in the middle.

The car will be used for funerals from Wilmington and Chester to the cemetery, the haul being 8 and 6 miles, respectively. At present it is necessary to make the trip in horse-drawn cabs or trolley cars, which pass the front gate. The speed of the car is limited to 12 miles an hour, being controlled by a governor.

Gives Guaranteed Service

The Oscar Lear Motor Co., of East Long street, Columbus, O., has placed into effect a new plan of furnishing motor truck service to business houses. The company is agent in central Ohio for the Kelly truck and has conceived the idea of furnishing what is styled guaranteed service. The plan is to furnish a truck with a driver every day to a certain business house at a certain sum monthly, the truck company taking care of all tire, gasoline and repair expenses. So far several of the Columbus business houses have taken the service, which has proved successful.



Among the Makers and Dealers

NEW Goodyear Branch—The Goodyear Tire and Rubber Co., of Akron, has opened a new branch in Hartford, Conn.

Changes Name—The corporate name of Fulton-Zinke Co. has been changed to the Zinke Co. The personnel of the company remains the same as it has been this year.

Jameson With Overland—C. S. Jameson, formerly with the Stoddard-Dayton as sales manager, has been appointed assistant sales manager of the Willys-Overland company.

Castle Going to Elmira—It has been decided to move the plant of the Castle Lamp Co. from Amesbury, Mass., to Elmira, N. Y., about September 1. The Elmira plant is to be a three-story affair, 60 by 300 feet.

Joins Seager Company—W. D. Hodson, secretary and manager of the Caloric Co., of Janesville, Wis., manufacturing fireless cookers and kindred devices, has resigned to become general sales manager for the Seager Engine Co., of Lansing, Mich. Harry Davies is acting manager of the Janesville company.

Githens Makes a Change—Herbert A. Githens has resigned his recent appointment with the United States Tire Co. to become vice-president and manager of sales of the new Federal Rubber Mfg. Co., Milwaukee, Wis. Mr. Githens was for many years manager of sales and general representative of the G & J Tire Co.

Rumor Is Denied—The report circulated at Racine, Wis., and other points that the J. I. Case Threshing Machine Co., of Racine, intended to purchase the Racine-Sattley Co., of Racine and Springfield, Ill., carriage and wagon manufacturer, and use the Racine plant for the production of bodies for Case cars, is denied by both interests. Thomas M. Kearney, secretary of the Racine-Sattley Co., said, "There is absolutely no foundation for the report."

Suit Over Bearings—Fichtel & Sachs, Schweinfurt, Germany, the makers of F. & S. annular ball bearings, and whose American representative is the J. S. Bretz Co., have begun an action against the R. I. V. Co., the importers of the R. I. V. bearings, for alleged infringement of the side entrance slot-filling patents which they own. The bill of complaint alleges infringement of both the Kouns patent No. 537,689, and the Blinn patent No. 818,734, for improvements in ball bearings, and concludes with the usual prayer for an accounting, and asks for an injunction to be issued by the court restraining and enjoining the defendants from making, importing, using or selling the invention or inventions covered by the patents in suit, or either of them, and for such other and

further relief in the premises as the nature of the case may require, and which to the court may seem meet, and which includes the payment of costs.

Halladay Agents Banqueted—Illinois agents of the Streator Motor Car Co., of Streator, Ill., were tendered a banquet by the company at Streator May 25 at which plans for the season were discussed.

Atwater Appointed—George S. Atwater has been appointed sales representative of the product of the Hayes Mfg. Co., Detroit, Mich., to represent that concern in all territory east of Michigan and all southern states east of the Mississippi river.

Would Standardize Rims—An attempt is being made by French manufacturers to adopt uniform rim sizes for all commercial vehicles using solid rubber tires. With this object in view a request has been made to the minister of war to fix a definite size for all trucks entered in the forthcoming competition, and to order the change of sizes for trucks approved in former competitions, when these do not accord with the manufacturers' standard. The minister is not willing to order the change to be made, but as he has strongly

recommended it, it is quite likely that the change will be carried out within a very short time. The two sizes proposed for the army trucks are 36.2 inches by 4.7 inches and 39.3 inches by 4.7 inches.

New Combination Formed—A new combination has been formed at Flint, Mich., called the Imperial-Mott department, for the purpose of furnishing the builders of pleasure cars and light motor trucks with wheels complete; that is, wheels, rims and hubs in combination. The home office is at Flint, Mich., with sales offices at 870 Woodward avenue, Detroit, Mich., and 903 Marquette building, Chicago.

Twyman Starts Company—Beginning June 1, the Studebaker agency or branch in Columbus, O., will pass out of existence, to be succeeded by the Twyman Motor Car Co., which will handle the Studebaker and E-M-F lines in central Ohio. B. W. Twyman is at the head of the new corporation. The new company will occupy the same sales room and repair shop at 264-266 North Fourth street. In addition to sixty towns which were included in former Manager A. J. Pray's territory, half of the state of Kentucky has been added to the territory covered by the Columbus concern.



TESTING TRANSMISSION GEARS

Two of the most important elements required in gears to be used in the transmission or change-gear mechanism of a motor car are that they be both hard and true; and all up-to-date manufacturers of these mechanisms are careful to test every gear for these qualities before assembling them into the case. Transmission gears must be hard in order that they may wear well, and they must be true so they may be fitted closely without being noisy. In the above illustration is shown the testing bench of the Hazard Motor Mfg. Co. factory and the means employed in testing each gear before it is assembled into the change-gear set of the Hazard unit power plant. At the left the gear G is arranged on an arbor, placed between the centers of a small speed lathe, and a micrometer gauge G is adjustably mounted on a standard secured to the bed-rail of the lathe; thus the point of the micrometer gauge can be placed close to the sides and face of the gear as it is revolved slowly by hand, and any irregularities readily discovered. At the right or opposite end of the bench is shown a gear R in the vice, ready to have its teeth tested for hardness with the scleroscope S. All hardened parts, such as transmission gears, camshafts, wrist pins, etc., are tested with the scleroscope for hardness.

A. J. Pray has resigned the position of manager of the Columbus branch to assume a higher position with the same company at Detroit. He will take up his new duties July 1.

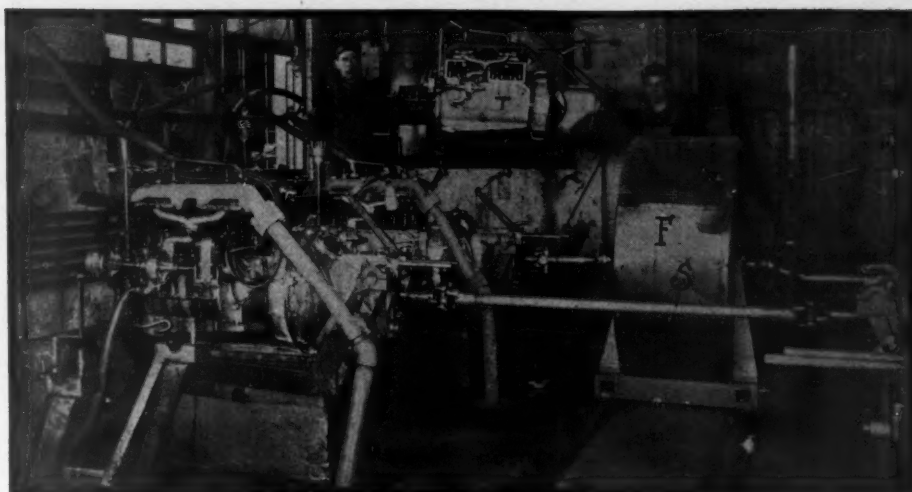
Dr. Lathrop Treasurer—Dr. A. B. Lathrop, of Swanton, O., who has been interested in the Henderson Motor Sales Co., Indianapolis, Ind., since the formation of the company, has become active in the management and taken the office of treasurer, and is now located at Indianapolis.

Another Fisk Branch—The Fisk Rubber Co., of Chicopee Falls, Mass., has opened a new branch at 1310-1312 K street, Sacramento, Cal. This makes thirty direct factory service branches now operated by the Fisk company in different parts of the country. Each branch is equipped with a repair department.

Apco Opens Detroit Branch—The Apple Electric Co. of Dayton, Ohio, has opened a new district agency at 1005 Woodward avenue, Detroit, Mich. The office will be under the management of R. C. Sheehan. Arrangements will also be made for the installation of Apco electric lighting systems on motor cars.

Koto Promoted—Alfred S. Koto, assistant manager of the advertising department of the Warner Instrument Co., of Beloit, Wis., for several years, has been promoted to the position of manager of the Detroit branch, effective immediately. Mr. Koto will be succeeded by R. E. Watrous, who has been advertising manager of the Morgan farms at Beloit.

Regal Changes—The Regal Motor Car Co. has just made a few changes in the east and middle west. The most important changes include the transfer of Frank G. Hood from the Buffalo district, where he had been district manager, to the Kansas City district. At Buffalo Mr. Hood will be succeeded by H. P. Hickey, who had recently built up the Indiana territory. George W. Franklin, who had the district managership for the state of Michigan, will have his work increased, for he will hereafter look after the Indiana territory also. G. E. Matteson, district manager of Philadelphia territory, will open his new headquarters as district manager in Cleveland and will cover Ohio and West Virginia. L. B. Moore, who had been district manager of the Cleveland territory, recently resigned to manage the Regal Sales Co. of Cleveland. Mr. Moore, hereafter, will devote his entire time to handling the retail end of the Regal Motor Car Co. business in Cleveland. Wilson Prentice, who has acted as special traveling representative in the northwest, has been appointed district manager with headquarters at Minneapolis. His territory takes in the states of Minnesota, North and South Dakota. A change has also been made in the metropolitan district. Max A. Weissenberger, who recently assumed duties as district manager of the New York territory, has had his field of activity enlarged. Besides taking care of his New



TESTING HAZARD POWER UNITS

In an illustration shown above, there is a view of a section of the Hazard Motor Mfg. Co.'s testing room, in which several interesting features of its equipment are exposed. After the Hazard unit power plant is assembled, it is taken to the testing department and run-in by another motor for about 2 hours; and if at the end of this time it is limber enough, it then is run light under its own power for 2 or 3 hours more. Following this it is employed to run-in another motor for a couple of hours, and then connected up to a fan and run for half an hour with wide open throttle. The power plant next is sent to the final test block, where it is coupled to a water brake and run at about 600 revolutions per minute, while the head inspector makes a thorough search for oil, water or gas leaks, and irregularities in the operation of the motor. After this, the preliminary test, the motor is returned to the overhauling department where the cylinders are removed, their condition examined, valves ground-in, pistons and rings looked over, all bearings examined and taken up if necessary, any defective parts found, replaced; and the motor reassembled and again put through a similar test. If in satisfactory condition the motor is passed to be cleaned and painted. In the illustration a shaft S with two universal joints is used in it for running in one motor by another, the testing stands being substantially arranged directly opposite each other. For the fan test, a similar but shorter shaft employed to make connection between the enclosed fan F and the motor. The fan is mounted on a truck which rolls on rails running down the aisle between the two rows of motor-testing stands.

York territory along the Hudson, he will supervise Regal sales in the city of Philadelphia.

Sales Concern Moves—The American Distributing Co., representing as sales representative, several prominent parts concerns, has removed its Chicago office to the Heyworth building, Wabash avenue and Madison street.

Making 100 Cars a Month—The Penn Motor Car Co., of which Albert G. Breitwieser, a well known wholesale lumberman of Pittsburg, has organized, is making headway at its big plant in the Homewood district in the east end. It is turning out 100 cars a month.

New Engine Company Organized—The A-C Motor Co., capitalized at \$100,000, is in the process of organization in Lansing, Mich., the new concern having taken over the Air-Cooled Motor Co. Not only will air-cooled gas motors continue to be built, but eventually the concern will also manufacture water-cooled gasoline motors. It is the plan of the new company greatly to enlarge and extend the plant of the old concern. For the present, however, the old factory will be utilized until a site for the new one has been secured and the new building constructed. The incorporators

of the company, which will file its papers of incorporation within a few days, are R. E. Olds, Wells G. Brown, Charles S. Smith, James H. Thompson and E. W. Olds.

Death of R. E. Hardy—R. E. Hardy, president of the R. E. Hardy Co., maker of spark plugs, of Chicago, died suddenly last Thursday. The cause of his death was cerebral apoplexy.

Warren Succeeds Elmer—The Haynes Automobile Co. announces the appointment of C. B. Warren as general manager, to succeed H. H. Elmer, resigned. Mr. Warren has been for some time identified with the Haynes company in the position of sales manager and previously was connected with the Stearns company, of Cleveland, Ohio, as western representative.

Making Flanders Electrics—Robert M. Brownson, general manager of the Flanders factory at Pontiac, Mich., has announced that within the coming year 3,000 of the new Flanders electrics will be manufactured in that city. The plants lately constructed are now in use and new additions are under way. A complete factory for the assembling of the Flanders electric is to be built at once. The Flanders branch at Chelsea is turning out the small parts for the electric cars.

OVERHEATING of a gasoline engine is due either to excessive friction between the bearing surfaces, improper burning of the gases or inefficiency of the heat radiating facilities. Primarily, the causes which bring about an overheated condition are chemical or mechanical disorders affecting the cooling, oiling, carbureting and ignition systems. In this article an effort is made to show, in a non-technical way, how and why an internal combustion engine overheats.

To fully appreciate the causes generally given for the overheating of motors, the motorist must first be familiar with the relative action between the cooling, oiling, carbureting and ignition systems and the required efficiency of each necessary to bring about a harmonious and satisfactory operation of the motor. It must be known that a mixture admitted to the cylinders must be of certain proportions in order to ignite at the proper time and burn at a required speed. It must also be known that when the mixture has the desired proportions it must be compressed to a certain degree, at which time an efficient spark must take place to ignite it, after which it must be allowed to expand as quickly as possible. It must be borne in mind that every change in the mixture must come about at a certain time and with certain rapidity relative to the movement of the piston. In other words, a mixture of certain proportions of air and gasoline must be squeezed or reduced to a certain degree of compression, and at or near the point of maximum compression it must be ignited. After ignition has taken place it must be completely burned in a certain fraction of a second in order to give off the greatest amount of heat and create a maximum power of expansion and when the piston is at the most advantageous position in the cylinder to absorb this power. And after the gas is expanded and the piston has reached the bottom center of the explosion stroke, the gas must have lost most of its power of expansion and heat. The carbureting and ignition systems are depended upon chiefly for the proper performance of these functions.

Duty of Lubricating System

In order that the piston and its connections to the crankshaft of the motor may operate with the required mechanical efficiency, lubrication is necessary; and it is the duty of the lubrication system to supply a required amount of oil to the various parts in just such quantities as are necessary for their satisfactory operation. The cooling system has a very important bearing upon the functions of the other features of the motor. It must keep the temperature in the cylinders low enough so that the incoming charge of gas is not ignited before the ignition spark occurs. It must also keep the temperature of the cylinders low enough at all times to prevent the destruction of the lubricant or warping and misalignment of the valves, cylinder walls and pistons. Anything, there-

fore, which in any way, at any time, tends to prevent any of these systems from performing their functions properly in the above relations will bring about an overheated condition of the motor.

The causes for overheating, then, may be divided into four classes, under the heads of Cooling, Lubrication, Carburation and Ignition.

Cooling Important Factor

Under the head of cooling will come all troubles which interfere with the proper radiation or carrying off of heat generated but not employed in useful work upon the piston head.

It is estimated that in the distribution of heat energy in a water-cooled gasoline motor 52 per cent is carried off by the water jacket, 17 per cent passes out through the exhaust and 15 per cent is absorbed by the various metal parts and fittings of the motor and given off to the air surrounding them.

It is understood, then, that a certain amount of the heat generated in a motor must be taken care of by certain of its features, and a failure on the part of any of these is liable to bring about an overheated condition. In a water-cooled motor it has been stated that the water must carry off 52 per cent of the heat generated. Now, if a motor is run for any length of time with an insufficient amount of water in the radiator, say just enough to carry off 30 per cent of the heat generated by each explosion, the remaining 22 per cent, which should have been carried off by the jacket water, will have to be absorbed by the exhaust, the metal of the cylinders and the fittings attached to them. The heat which is absorbed by the water passes off very much more quickly through the radiator than that which is absorbed by the metal of the engine and radiated into the air surrounding it, and it does not take long before these parts begin to absorb the heat so much more rapidly than they can get rid of it that they become overheated.

In water-cooling systems which employ a pump and a fan, the water enters the top of the radiator and passes down through its tubes or channels and passes out at the bottom at a considerably cooler temperature. This cooler water must be conducted to the pump and then from the pump through a series of hose and pipe connections into the water jackets of the cylinders. Here its duty is to absorb the heat from the walls of the cylinders and valve chambers and then pass off through another series of pipe and hose connections to the radiator to again be cooled. Anything which may abnormally reduce the ability of the radiator to sufficiently cool the water which passes through it, anything which will impede the flow of water throughout the system, will render the cooling system unable to carry off the required amount of heat. Therefore we have overheated conditions, due to deposits on the inside of the radiator, which

Reasons for the Overheating of Gasoline Engines in Motor Cars

not only reduce the flow of water through it, but also decrease the radiating efficiency. We have overheated conditions caused by frayed hose connections, which impede the circulation of water; from broken pump shafts or other mechanical disorders of the circulating device; from gaskets in which the holes are too small, and in fact from anything that will prevent a normal circulation of the cooling agent or prevent it from absorbing and giving off its heat.

Overheating Conditions

Overheated conditions are brought about by an inoperative fan because sufficient air is not drawn through the radiator to carry off the heat radiating from the cooling medium inside. And there are cases where overheating has occurred because the hood and mud-pan inclosed the motor so completely that the circulation of air through the radiator and around the motor was impaired. A muffler, clogged with soot, also will cause overheating by increasing the back pressure, preventing the exit of the burned gases with the heat which they contain and causing consequent contamination of following charges of gas, rendering it slow burning and of insufficient volume.

Although a cooling system is generally designed to carry off excessive heat in reasonable limits, there is a limit to its efficiency. Therefore, when excessive heat is generated, as above described, this limit is soon passed. When overheating begins to take place, the water begins to boil, steam issues from the radiator, there is a perceptible loss of power, and if all these signs are ignored by the driver, abnormal expansion of the overheated pistons soon takes place, which is followed by a scoring of the cylinder walls, seized pistons, or both.

Lubrication Requirements

A very common cause of overheating is that brought about by some disorder in the lubricating system. The requirements of the lubricating system are that a sufficient supply of a proper grade of oil must be delivered to the various working parts of the motor. A sufficient supply means that just enough and no more of the lubricant must be conducted to the bearing surfaces to render them sufficiently slippery, and a proper grade means that the oil should be of such consistency as to feed well with the lubricating arrangements provided, capable of withstanding the normal temperature conditions, of such oil-

Cooling, Oiling Carbureting or Ignition Systems Usually Affected

ness as to reduce friction to a minimum, and contain a minimum amount of constituents prejudicial to its sustained effect. If an oil is used which contains grit or abrasive substances it will not reduce but will increase friction between those parts in which it comes in contact and prove detrimental to the wearing surfaces of those parts. If an oil is used which in cold weather becomes so thick that it will not flow to the bearing surfaces in sufficient quantities, they will be subject to excessive wear, and excessive heat will be generated by the increased friction. If an oil is used which becomes so thin when subject to heat that it breaks down and loses its lubricating qualities, or is evaporated or carbonized, the surfaces to which it is conducted will suffer from excessive wear and an abnormal amount of heat will be generated. And if a lubricant is employed which is not free from acids which attack and destroy the polished surfaces of the metal, undue friction will take place between these surfaces as soon as they become rough, and rapid wear and excessive heat are the inevitable results. On the other hand, any mechanical disorder in the lubricating arrangement is liable to cause overheating by reducing the supply of oil to the various parts. A broken shaft or chain or anything which renders the oil pumps inoperative, a faulty valve or a clogged or leaky oil lead, a leak in the pipe or valve between the exhaust pipe of the motor and the pressure tank of the oiler as in a pressure feed system or, in fact, any of the numerous little disorders of this kind which retard or obstruct the flow of the lubricant, are apt to bring about an overheated condition to some part of the motor which, on imparting excessive heat to component parts, will in time bring about a general overheated condition. The efficiency of the oiling system is also affected by improper cooling and carburation.

Poor Grade of Oil

A poor grade of oil causes overheating in several ways, according to the character of the oil. A lubricant with good lubricating qualities but low flash point—that is, an oil which would be very efficient on reasonably cool bearing surfaces, but which cannot stand the heat of a cylinder, will become so thin when subject to the heat of the burning gases in the cylinder that it will lose its good lubricating qualities, and the inevitable result is that the cylinder will run dry, the heat caused

by the friction between the piston and cylinder walls, combined with that of the burning gas, will be too great to be carried off by the cooling system; this excessive heat will cause the piston to expand abnormally until first perhaps the rings will be tightly held in their grooves, or be warped out of shape, or both; further expansion of the piston causes these rings or their protruding edges or ends to cut into and scar the cylinder walls, then if the piston is itself a close fit in the cylinder it will begin to bind, the motor will slow down, and if the clutch is not disengaged immediately and the motor shut down, the pistons will probably seize and serious damages result, such as broken rods or crankshaft and the general destruction caused thereby. Another grade of oil will carbonize when subject to the intense heat of the cylinder, and if fed in sufficient quantities will perhaps keep the piston and cylinder walls sufficiently well lubricated, but the superfluous amount necessary for this will accumulate on the cylinder and piston heads and around the valve chambers. As these accumulations gradually thicken, the area of the combustion is slightly decreased and the compression thereby increased, accompanied by an intense heat. This carbon does not give off its heat through the metal of the cylinder to the cooling system as rapidly as is necessary, with the result that as the heat increases the little protuberances of the carbon incrustation become redhot or incandescent and preignite the incoming charge of gas. This preignition causes the mixture to explode before the piston has begun its downward stroke, and a pound or knock is audible at each revolution of the motor. If it were not for the torque of the flywheel and momentum of the crankshaft would be forced to turn a few revolutions in the opposite direction, then stop. Preignition puts a terrible strain on the cylinders, connecting rods, crankshaft and bearings of a motor, and should be immediately investigated. Accumulation of carbon and preignition therefrom is not always due to the use of a poor grade of oil, however; even the best grades lose their lubricating efficiency and are carbonized when the heat to which they are exposed becomes abnormally high; and this abnormally high temperature may even in a motor of most excellent design, be caused by an affliction of the cooling, carburation, oiling, ignition systems, or to other little mechanical disorders to which a motor is occasionally subject, and which, although of rare occurrence, are too numerous to mention.

Inefficient Carburetion

In studying the causes of overheating in a gasoline motor, the following facts must also be borne in mind: The greater the compression of a good mixture before it is ignited, the more readily it will ignite, and the more rapid its combustion. The more nearly correct the proportions of gasoline and air in a gaseous mixture, the more

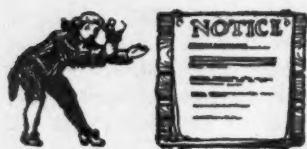
completely will it burn. The more completely a mixture is consumed, the greater the amount of heat generated. The greater the intensity of the heat generated, the greater its power of expansion; and the greater the power of expansion the greater the pressure on the piston.

Common Cause of Overheating

A common cause of overheating is that which comes from an over-rich mixture; that is, a mixture which contains too much gasoline and too little air. The cause of this is that the mixture which is over-rich does not ignite or burn as rapidly as it should, with the result that when the ignition spark takes place with the piston just beginning its downward stroke the gas ignites so slowly that the piston is perhaps half way down before an explosion takes place. By this time much of the compression is lost, as well as much of the power of the explosion, and the gas will still be burning with intense heat as it passes out through the exhaust valve. It is plain from this that if the motor is allowed to run too long on an over-rich mixture after the cylinders become so hot that the water in the jackets is unable to properly care for it, the water will begin to boil and a steaming radiator will warn the observing driver that the motor is being overheated.

Poorly Timed Ignition

Running the motor with retarded ignition causes overheating in almost the same way that a rich mixture does. The gas is not ignited until the piston is half way down on its explosion stroke, and having lost much of its compression, it burns more slowly than it should, and the intense heat given off when it does explode does not only come in contact with the walls of the combustion chamber as it should, but, owing to the position of the piston, the hot flames are brought directly in contact with the lubricated bearing surface of the cylinder walls, burning off the lubricant, increasing the heat generated by friction and causing them to absorb the heat of the combustion, to which only the walls of the combustion chamber should have been exposed. It must be remembered that when a motor is working properly, the gas is supposed to be ignited and exploded, just as the piston is beginning its downward stroke. In this way the most intense heat generated by the exploding gas does not come in contact with the lubricated bearing surface of the cylinder wall. Therefore, anything that will cause the gas to ignite more slowly or burn more slowly after ignition has taken place, will cause the burning mixture to give off its most intense heat when the piston is far down on the explosion stroke. This brings the hot flames directly in contact with the lubricated bearing surfaces of the cylinder walls, and not only burns up the lubricant thereon, but imparts an abnormal amount of heat to these surfaces which should have been used up in forcing the piston outward.



Brief Business Announcements



LAKE MILLS, Wis.—Damp Brothers are new agents for the Paige-Detroit.

Cleveland, O.—Frank Judd has accepted the agency for the American line of cars.

Rhineland, Wis.—Matthew Christensen will occupy the new garage being erected on Stevens street. It will be ready July 1.

Boston, Mass.—Frank W. Tucker, for 11 years connected with the Goodrich company, has been placed in charge of the solid tire department of that company.

Nebraska City, Neb.—J. H. Markel, of this city, is starting to erect a new garage, 48 by 96 feet. It will be two stories high, decorated in old English style, and will cost \$15,000.

Baltimore, Md.—Griffin's garage now has the agency for the Premier, making three cars in all that this firm represents. The other two are the Knox and the Welch-Detroit.

Boston, Mass.—Frank Crockett, for many years with the A. P. Underhill Co., handling the Knox cars, has resigned, to take a position with the Locomobile company as salesman.

Boston, Mass.—R. B. Davis, who has been connected with the Maxwell, Regal and Marmon agencies in Boston as a salesman, has now joined the Warren-Detroit agency in that city.

Toledo, O.—The agency for the Warren-Detroit in Toledo and northwestern Ohio has been taken over by the Locke-Cone Co. It formerly was handled by the Norris-Toledo Motor Sales Co.

Warren, O.—Plans have been completed for a large plant for the Universal Auto Truck Co., to be erected at Warren. The plant will consist of an extensive main building and a number of smaller structures for the various departments.

New York—Walter A. Schott has resigned as general manager of James L. Gibney & Brother, of New York. Prior to the opening of Gibney's New York establishment he was for 5 years the eastern representative of the Prest-O-Lite Co.

Findlay, O.—The Adams Brothers Co., manufacturer of the Adams trucks, is building another large addition to its plant, to be used for frame assembling. The building is 87 feet wide and 200 feet long and will give an additional 18,000 square feet of floor space.

Oshkosh, Wis.—The Everhart-Delaney Co., recently incorporated for \$150,000, has commenced construction work on a large drop-forging shop, to be ready June 15. The company intends to do considerable work in the line of making drop-forged parts for motor cars and trucks. Charles M. DeLaney, of Poynette, Wis., is presi-



NEW BERGDOLL BUILDING, WHICH IS LOCATED IN PHILADELPHIA

dent and C. W. Everhart, of Oshkosh, is secretary.

Racine, Wis.—J. F. Johnson, of the Johnson & Field Mfg. Co., of Racine, has been appointed representative of the Glide line.

Cleveland, O.—The Grabowsky Power Wagon Co., of Detroit, has opened a branch here, with Morris Roheimer as manager.

Delavan, Wis.—J. C. Hebbe, proprietor of a garage at Fort Atkinson, Wis., has leased the Van Velzer building at Delavan, Wis., and will remodel it into a garage.

Leipsic, O.—The Koeb Thompson Motors Co., of Leipsic, O., has filed papers decreasing its capital stock from \$300,000 to \$30,000. Ralph Thompson is president and W. E. Edwards secretary of the company.

Toledo, O.—Harry H. Dennis and Lewis E. Barger have taken over the Rambler business in Toledo formerly conducted by E. F. Bienhard. The concern is distributor for Rambler cars in northwestern Ohio and known as the Rambler Motor Sales Co.

Depere, Wis.—The Depere Motor Co., Hallett & Miller proprietors, has opened a garage and agency in the Chase building. The company represents the DeTamble line. The DeTamble agency for Grant county, Wisconsin, has been placed with L. Abraham and Amos Brown, of Bloomington, Wis.

New York—George Schuster, who drove the Thomas to victory in the New York-Paris race, has followed C. S. Henshaw from the Boston branch to accept the position of superintendent in the service department of the Thomas New York branch. H. H. Hodgdon, assistant manager of the E. R. Thomas Motor Branch Co., Boston,

has been promoted to the New York branch.

Baltimore, Md.—O. G. Hoff has been appointed manager of the Washington branch of the Century Tire Co.

St. Louis, Mo.—The Lindsey Motor Car Co. is now occupying its modern new three-story salesrooms at 3327 Locust street.

Washington, Ill.—The firm of Knaul & Lorenzen has dissolved partnership, to be succeeded by the firm of Knaul & Dingle-dien, which will handle the Everitt.

Boston, Mass.—An agency has been opened in Boston by the Auburn Mfg. Co., makers of the Ten Eyck tire pump, salesrooms being located on Tremont street.

Boston, Mass.—More new buildings are being planned for Beacon street near Commonwealth avenue between the Autocar and Peerless structures and they will be occupied by the Premier branch and the Firestone Tire Co.

Boston, Mass.—Manager E. P. Webber is now installed in the new structure erected for the Diamond Rubber Co. branch on Boylston street in the heart of the motor colony. It is one of the finest edifices devoted to motor interests in Boston.

Canton, O.—The Knight Tire and Rubber Co. has been incorporated with an authorized capital of \$300,000 to manufacture tires and other rubber products. The incorporators are G. F. Knight, H. C. Evans, C. H. Knight, W. S. Cunningham and M. J. Shea.

Toledo, O.—The Toledo Tire and Repair Co., which recently accepted the agency of Firestone tires in this territory, now is comfortably located at its new quarters on Erie street. This department of the business is in charge of F. W. Martin, who had 12 years' experience with Akron tire factories.

Youngstown, O.—The City Auto Garage Co. has been incorporated with a capital of \$20,000 to manufacture and repair motor cars and to do a general garage and motor livery business. The incorporators are John W. Kuhns, Frank P. Whiteside, Emil A. Renner, Henry J. Kuhns and Emory G. Cronick.

Green Bay, Wis.—The Lucia Brothers Motor Car Co., of Green Bay, Wis., has been appointed distributor for Wisconsin and northern Michigan of the Thomas line. The company is northeastern Wisconsin agent for the Chalmers and Hudson cars. In addition to the main garage at Green Bay, it has a large branch at Oconto and sub-agencies at Oshkosh, Iron River, Clintonville, New London and Eau

Claire, Wis., and Menominee and Calumet, Mich.

Cleveland, O.—The Cleveland Taxicab Service Co. has reduced its authorized capital stock from \$100,000 to \$5,000.

Boston, Mass.—The Oakland branch now has its own garage in Cambridge, having secured quarters in the Shoe and Leather building a few days ago.

Cleveland, O.—K. M. Allen has organized the Jackson Sales Co. here to handle the Jackson car in northern Ohio. Salesrooms will be established on Euclid avenue.

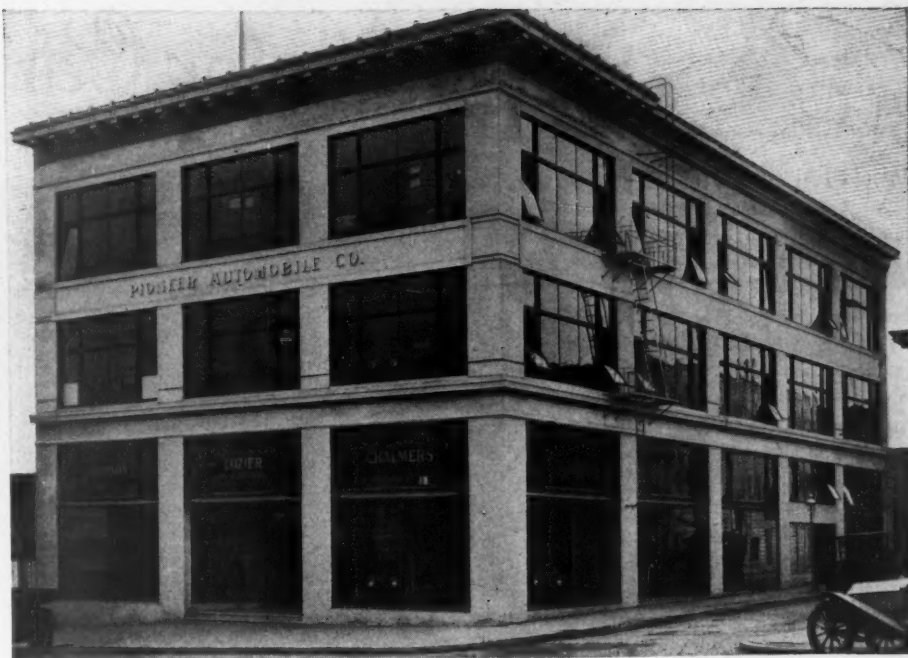
Boston, Mass.—The Boston branch of the Gray & Davis Co. will be moved shortly from its salesrooms on Boylston street to new quarters being fitted up for it in the Taxi-Service company building in the Back Bay.

Boston, Mass.—The Eastern Motor Sales Co. has been organized to handle the product of the Kelly factory, which comprises the Kelly and Frayer-Miller trucks, and P. S. Aultman is in charge of the branch, which is located in the Shoe and Leather building.

Dodgeville, Wis.—The Dodgeville Motor Car Co., of Dodgeville, Wis., has opened its garage in the remodeled building of the New Stratman Vehicle Co. J. H. Ford has been appointed manager. The company is representative of Kisselkar, Buick, Oakland, Garford, Studebaker, E-M-F and Flanders.

Portland, Ore.—To keep pace with their steadily growing business, the H. L. Ketts Auto Co. again has found it necessary to add more room to its present quarters and therefore has leased the adjoining building. When the adjoining structure is remodeled it will have a floor space of 40,000 square feet.

Boston, Mass.—The Gramm Motor Truck Co. of New England has just been organized, with C. I. Fisher as president, to handle the Gramm trucks, also the Aries, a French vehicle. Mr. Fisher formerly was manager of the Boston branch of the Reliance. The company has its sales room at present at the corner of Summer street and Atlantic avenue and a commercial maintenance garage at 161-163 A street,



NEW HOME OF PIONEER AUTOMOBILE CO., SAN FRANCISCO

South Boston. The company is capitalized at \$25,000.

Green Bay, Wis.—Burr Colburn is a new agent for the Nyberg Automobile Co., of Chicago, in northeastern Wisconsin.

Bucyrus, O.—Samuel Hirtz, of the Bucyrus Cycle and Auto Co., of Bucyrus, O., has taken the agency for the Maxwell in that locality.

Columbus, O.—The Hudson Sales Co., of Columbus, Ohio, located on North Fourth street, has taken the central Ohio agency for the Whiting line.

St. Louis, Mo.—The Automobile Gas Generator and Motor Car Co. has been incorporated in St. Louis with a capital of \$50,000. The incorporators are Arthur O. Ruthven, Fred Holke and Josef Fischer.

Marinette, Wis.—A. C. Templeton has resigned as president and general manager of the Templeton-Barrett Co., Marinette, Wis., manufacturing spark plugs, accessories and conducting an agency and garage, and will be succeeded by J. E. Baum. Mr. Templeton retains his interest

in the company, but will devote his entire time to the Kisselkar agency.

Columbus, O.—Walter Bower and W. C. Dickerson have opened a garage and repair shop at 1162 North High street.

Columbus, O.—The Franklin Cycle and Supply Co., of 41 East Gay street, has taken the central Ohio agency for the Miller tires.

Chicago—The Townsend-Harris Co., 1330 Michigan avenue, is representing the Fleutje shock absorber and the Winterton windshield.

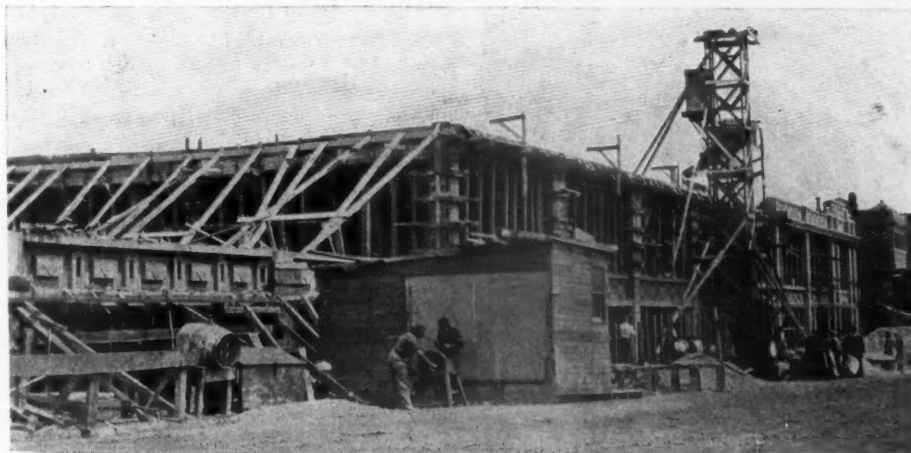
Lincoln, Neb.—The Moore Auto Co. has moved into larger quarters at 219 North Eleventh street, and has taken the agency for the Hupmobile.

Milwaukee, Wis.—James F. Howard, 322-324 East North avenue, representing the Cole and Dan Patch cars, has been appointed agent for the Empire, formerly handled by the Modern Motor Co.

Boston, Mass.—Russell T. Green and Fred K. Swett have formed a co-partnership under the name of the Green & Swett Co., to take over the business of the Angier Supply Co. The new firm will use the Angier store, 737 Boylston street.

Columbus, O.—The Twyman Motor Car Co. has been incorporated with a capital of \$20,000 to manufacture and sell all kinds of motor cars and accessories. The incorporators are B. W. Twyman, Carrie E. Twyman, Lulu Leopold, Eugene Morgan and Henry O'Kane.

Omaha, Neb.—The Powell Automobile Supply Co. is having a new building constructed, having outgrown its present quarters. The building will be two-story, brick, 30 by 120 feet. The basement is to be used as a tire storage room, the main floor for sales purposes, and the second floor for storage and repair room.



NEW DYNAMO-MAKING PLANT OF GRAY & DAVIS CO.



The Motor Car Repair Shop

ANYTHING in the way of repairshop devices, furniture and equipment, that facilitates the operations of the workmen adds to the efficiency of the shop. In Fig. 1 are shown two very handy pieces of shop furniture that might be used to an excellent advantage in repair departments of many garages and motor car agencies throughout the country. These pieces of furniture are portable tool and parts racks. The one at the left represents the type of stand used by workmen employed in the assembling department of the Franklin factory. It is mounted on castors so that it may readily be moved about, and it is so designed as to be used as a sort of portable workbench. The small tools such as wrenches, files, screwdrivers, drills and the like are carried in a portable tool box B, which generally rests on the top of the stand; the brace and bending iron and large tools of this character are suspended from hooks on the sides of the box portion of the stand, and that portion of the top not occupied can be used for other tools or motor car parts; or by lifting the toolbox off a clear space is afforded that provides the facilities of a workbench. An important feature of this structure is that the top is of the sliding hatch type and forms the cover to the box portion, so that when the day's work is done the workman has but to slide back the top, put the tools inside the box portion, then slide the top back into place, lock it if necessary, and everything is safe until the tools are again required.

The stand at the right is a representa-

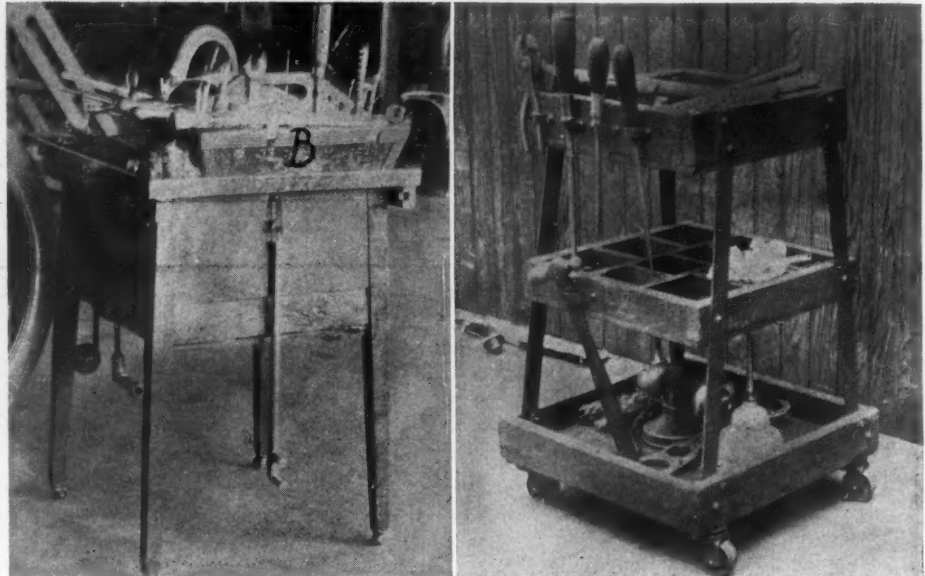
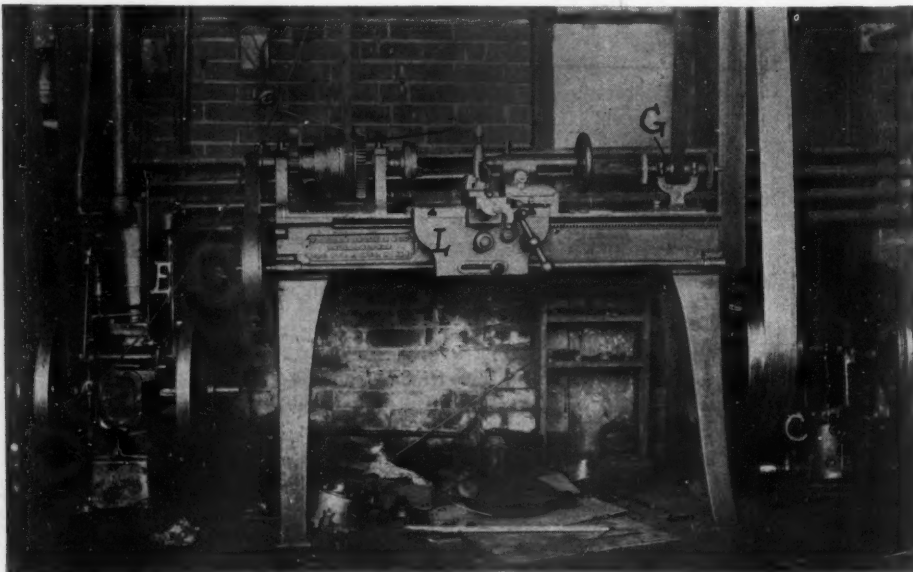


FIG. 1—PORTABLE STEEL TOOL AND PARTS RACKS SUITABLE FOR USE IN A MOTOR CAR FACTORY. ON THE LEFT IS A STAND FOR ASSEMBLING AT THE FRANKLIN FACTORY. THE ONE ON THE RIGHT IS IN THE SELDEN PLANT

tive type of those employed at the Selden motor car plant. It has no facilities for locking up the tools but nevertheless is a very useful article. The top shelf is adapted for large tools, motor car devices or parts, etc.; the middle shelf is divided into small boxes for nuts, bolts, washers and the like; whilst the bottom shelf carries wheelpullers, hub-wrenches, oil cans and such tools as are bulky and less often required; the means of arranging files, pliers and the like is very clearly shown.

Many motorists are unaware that the gap between the points of a spark plug plays an important part in the proper functioning of the motor car. It also is not universally known that the size of the gap of plugs used in a magneto system must be considerably smaller than that of plugs used with the battery and coil systems. Gaps of plugs using magneto current should measure about 1-64 inch, and gaps of battery systems should measure about $\frac{1}{32}$ inch. It is most important that all gaps of a set of plugs be of an equal size, otherwise proper synchronism of the ignition spark will be difficult to obtain and the motor explosions will not occur as regularly as they should. The reason small gaps are required in a magneto system is because of the fact that at very slow speeds the magneto does not generate a strong current, and unless the gaps are small, the resistance may be too great for the current to jump and no spark will occur. As a result, misfiring will take place and a jerky action of the car will be noticed or the motor stalled. For this reason, when a driver desires to run slowly on the high gear, as in congested traffic, if the car begins to jerk and threatens to kill the motor, better service can be obtained by switching over to the battery system until more speed can be made. In cars having dual ignition systems, systems where both the battery and magneto current passes through the same circuit-breaking mechanism, one should avoid running on the battery as much as possible, for the battery current destroys the platinum points of the circuit-breaker very much quicker than the magneto current.



A VIEW OF SMALL EASTERN REPAIR SHOP SHOWING A ONE-CYLINDER ENGINE E AT THE LEFT WHICH FURNISHES POWER FOR THE LATHE L, THE EMERY GRINDER G AND THE AIR COMPRESSOR C. THE EMERY GRINDER IS SECURED TO THE UNUSED END OF THE LATHE BED; AND THE AIR COMPRESSOR IS MADE FROM AN OLD MOTOR CAR CYLINDER



Development Briefs

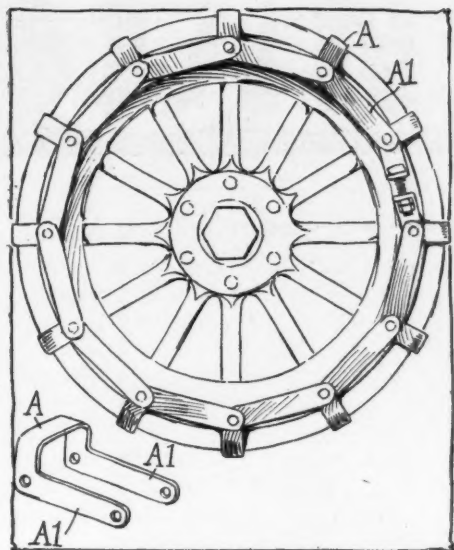


FIG. 1—THE GAYLORD TIRE GRIP FOR COMMERCIAL VEHICLES

The Gaylord Tire Grip

A TIRE grip for use on commercial vehicles with solid rubber tires is being marketed by the Gaylord Automatic Strop- per Co., Stamford, Conn. It consists of a dozen or more transverse steel bands which rest on the tire, and are hinged together. The link is made up of a U-shaped cross piece. A, which bears on the tread of the tire, has arms A1 which parallel the rim and serve to unite one link with the adjacent links. This link is of steel $\frac{1}{8}$ to $\frac{3}{8}$ -inch thick and from 1 to 2 inches wide, according to the tire on which it is used. The grip is drawn tightly to the tire by the connecting bolt B. These grips can be used on dual tires.

Neverout Searchlights

In the Neverout double focus searchlight for acetylene gas two different reflecting surfaces are used. One of these is a mirror consisting of a concave-convex lens made after a special formula. In front of this

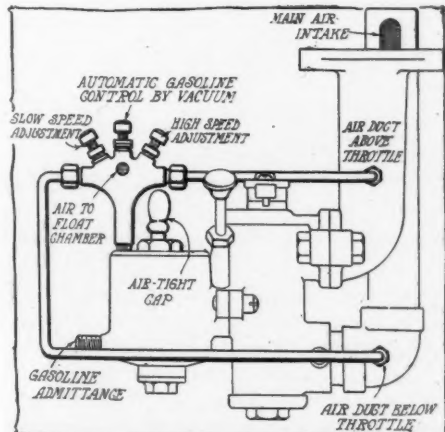


FIG. 2—THE BINGHAM COMPENSATOR ATTACHED TO A CARBURETER

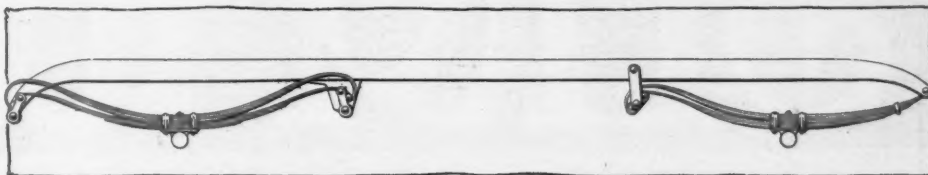


FIG. 3—UNIQUE DESIGN OF ONE TYPE OF PERFECTION SPRINGS

mirror is a parabolic reflector, the inner portion of which is cut off to allow the rays of light reflected from the mirror at the rear to be unobstructed. These two reflecting surfaces do not have the same focus, so, instead of one large source of light, two smaller ones are provided in the form of two distinct burners, one at the focus of each lens.

In this way it is believed that a better distribution of the reflected light rays is obtained than is possible with the usual single source of light. The construction of the

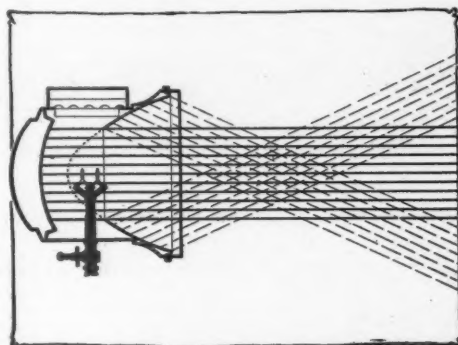


FIG. 4—NEVEROUT DOUBLE-FOCUS SEARCHLIGHT SHOWING TWO BURNERS

lamp with its two burners, one behind the other, is shown in one of the illustrations, which also depicts the assumed directions of, both the direct and reflected rays of light. These lamps are produced by the Rose Mfg. Co., Philadelphia.

Converts Gas Lamps to Electric

Many owners desire to change their acetylene lighting system into electric but do not wish to discard the old lamps and purchase new ones. But the reflecting surfaces of the gas lamps are not designed to give the best efficiency with electric lights, and much better distribution of the light is obtained if a correct parabolic reflector is used.

The Guide Motor Lamp Mfg. Co., of Cleveland, O., has brought out a special fitting combining a reflector, a socket for the electric bulb, and a connector. Brackets on the back of the reflector slip over the gas burner pillar or stem after the burner is detached. The device is shown fitted to a gas lamp in Fig. 5. It is designed to fit any lamp and is said to require only a moment to adjust. It will be

noted that the parabolic reflector is supported at two points, at the center and near the bottom, by a Z-shaped standard. This makes for steadiness of the fixture.

Perfection Springs

An unusual type of motor-car spring is marketed by the Perfection Spring Co., of Cleveland. In addition to the standard types of springs, this firm produces a spring to be applied to the body where especially easy-riding qualities are desired. As shown in the illustration, the springs are semi-elliptic with scroll hangers. The rear spring consists of two separate springs, one above the other, and the front springs become two separate parts from the front axle back to the hanger. It will be noted that the rear shackle of the forward spring is pivoted in the middle and a scroll end of the divided spring is hung at either end of the shackle.

Bingham Compensator

A device which has been designed with a view to reducing the fuel consumption in gasoline engines is called the Bingham compensator and is made by the Bingham Mfg. Co., of Cleveland, O. It can be fitted to any carburetor and its attachment to the latter is shown in Fig. 2. The method of attachment is simple, and any mechanic can fit and adjust the device. It is claimed that it will not only reduce the consumption of gasoline, but owing to the more perfect carburetion obtained, will also make the engine more flexible and reduce the carbon deposit in the cylinders.

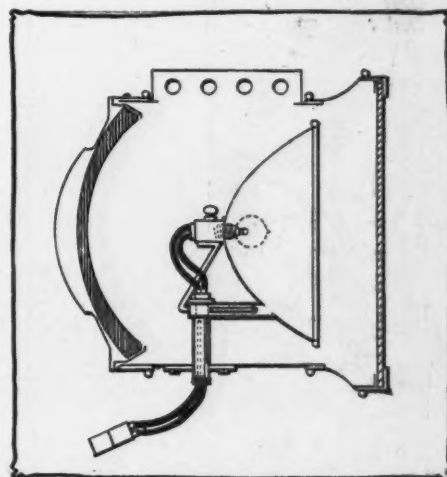
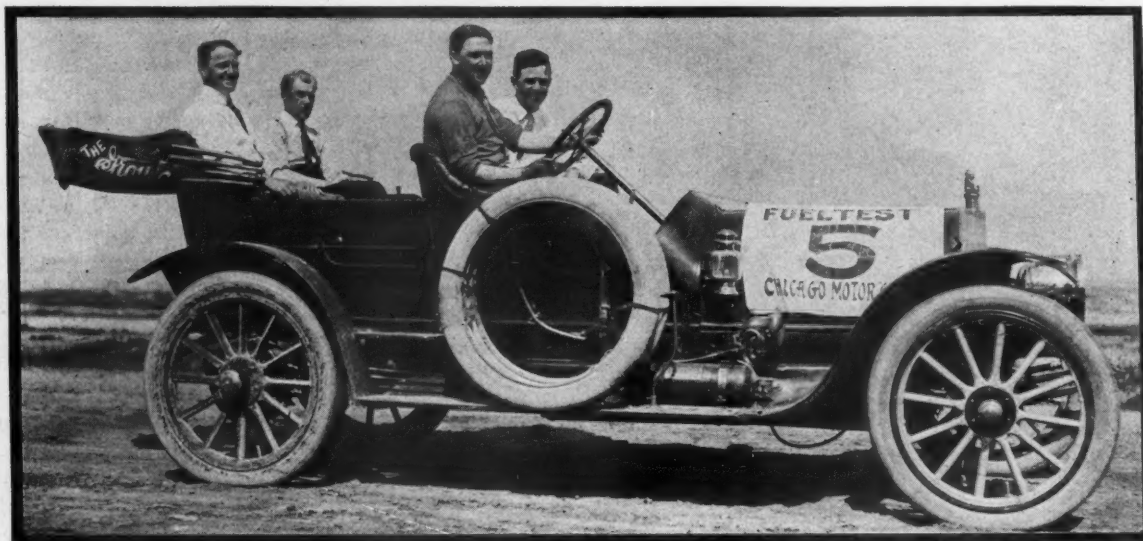


FIG. 5—GUIDE ATTACHMENT FOR CONVERTING GAS LAMPS INTO ELECTRIC

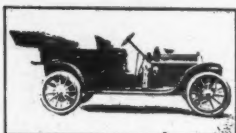
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Gentlemen:-

It will undoubtedly interest you to know that the Type A #3 carburetor, #89450, which was used on my GROUT 45 H.P. car, gave absolute satisfaction throughout the entire trip and required no adjustments whatsoever, in fact I did not leave the driver's seat from the time I left Chicago, until return to the Checker's Station; at which time the gasoline was measured and the results figured out, which returns me a winner of the two formula classes, with a percentage of 3.00%.

Although stock car class #1 touring cars in the formula division, were run separate from the stock cars class #2 toy tonneaus and roadsters in the formula division, the result of the percentage should be taken as a winning over all stock cars in both classes under this division. You will note that our percentage is over eighteen-hundredths greater than the nearest competitor. This is truly a great victory for a good car and a good carburetor.

I have always been a strong believer in the absolute reliability and economy of the Stromberg carburetor, and even though other carburetor concerns offered various inducements for me to switch, I pinned my faith to the Stromberg, and as you see, won out as usual.

Yours very truly,

M. E. Halbert

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